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The Copperbelt— The Testbed of Federation

ECONOMIC progress: social and political advancement. These are the twin yardsticks by which Africans at least will judge the success of Federation in the Rhodesias and Nyasaland, just as the success which attends these aims will largely shape the course of political events in these territories. If Federation is to succeed, it can only do so within the framework of a multi-racial society; although it is no more than an accident of geology and of the circumstances of British colonial policy which have conspired to make the Copperbelt the scene of the most significant exercises in the ideal of partnership. It is thus inevitable that the members of the Monckton advisory commission will be considerably influenced by the impressions they form of the extent to which African aspirations and European self-interest have become rationalized and harmonized in this part of the Federation.

It has been said often enough that a failure of race relations on the Copperbelt could be fatal for Federation. That such a failure has not occurred is a tribute first and foremost to the vision and patience of both the Rhodesian Selection Trust and Rhodesian Anglo American groups and, as it must also be conceded in retrospect, to the good sense of the European mineworkers who, if we judge them on deeds rather than words, have shown, even if belatedly, an instinct for compromise on advancement issues without which the mining companies would have been powerless. It is to be hoped that good sense will again prevail in the exploratory negotiations currently going on between the companies and the European mine-workers regarding the next stage in the Africanization of further job-categories.

If at times the main burden of social and economic reform on the Copperbelt has seemed to fall on the R.S.T. group, this is to be attributed less to any divergence of view (or varying sense of urgency) in these matters between the two groups than to the fact that R.S.T. has its roots implanted in London and New York and thus speaks at times perhaps with less inhibition than can Rhoanglo, whose roots reach back to Johannesburg. Certainly, since his appearance on the platform at the inaugural meeting of South Africa's new Progressive Party, Mr. Harry Oppenheimer has left us in no doubt where he himself stands politically in these matters.

Whatever differences of emphasis there may have been in earlier years in the attitudes of the two groups towards the advancement issue, both groups have, over the past two years, shown a marked unity of purpose, while in matters of welfare and education, the standards enjoyed by Africans on the Copperbelt have long been higher than almost anywhere else in the continent.

Both groups have, however, persistently taken a wider view of their responsibilities in the Federation than that required for the limited objective of making partnership on the Copperbelt a reality, and, apart from the major support which copper mining gives alike to the Federal and Territorial exchequers both groups have made other distinctive contributions towards the strengthening of the

Federation, in which perhaps, the difference of approach between the two groups has been rather more noticeable.

Thus the part which R.S.T. has played in such ventures as the Kafue Flats scheme, in the launching of the *Central African Examiner* and in its loans to the Northern Rhodesian and Nyasaland Governments for speeding up African development suggests a readiness to promote necessary or desirable projects which are unlikely to be directly remunerative to its sponsor. Rhoanglo's contribution on the other hand, though equally important has been more towards strengthening the financial equipment of the Federation through, for example, its assistance at the birth of a money market, and its participation in the new Industrial Development Corporation.

From the standpoint of the copper companies themselves, the two most significant events of the year, as they emerge from the chairmen's annual statements appearing on pages 548 to 552, have been the implementation of the Leggett recommendations following the prolonged strike of European mineworkers in the autumn of 1958 and the steadily improving market for copper itself.

The implementation of Sir Frederick Leggett's recommendations, have taken the form first of the setting up of a Mining Joint Industrial Council which seems to be providing both a more informal and a more regular meeting table for the companies and the European mineworkers than had proved possible in the stiffer atmosphere of Chamber negotiations. Secondly, the provision of three-day cooling-off periods should certainly help to prevent the unpremeditated degeneration of minor disputes into major ones, while of even greater importance may be a decision to place upon the lower levels of management — the foremen, shift bosses, supervisors and other officials — greater status and authority for settling disputes directly they arise. In essence these are all "fire prevention" measures but they are nevertheless of pre-eminent importance in an atmosphere where emotions are apt to run high and engulf fundamentally good intentions.

The financial year July '58 to June '59 has seen a marked revival in the copper price from the low levels of the previous year. The improvement was brought about initially by the readiness of the major copper mining interests around the world to effect substantial production cutbacks on their own initiative and has subsequently been assisted by the growing strength of the demand for copper, partly reflecting a genuine revival in consumption and partly the stocking up by American users in anticipation of the steel and copper strikes which duly arrived this summer.

The two Copperbelt groups have never shown quite the same identity of viewpoint on copper economics as they have on African affairs, and once again it is possible to detect in Mr. Harry Oppenheimer's remarks to Rhokana shareholders a greater concern with the short term market situation while Sir Ronald Prain's comments are directed more to the long-range problem of copper supply.

Thus, as Mr. Oppenheimer points out, the heavy stocks which were built up in anticipation of U.S. steel and copper strikes have been much reduced, although provided American conditions soon return to normal, he sees no reason why there should be a real shortage of copper. Certainly, as we suggested in the leading note of our issue of November 13, there is in effect no copper shortage today outside the United States and, but for the uncertainty regarding the possibility of the resumption of the longshoremen's strike on December 27, the present pressure on copper prices inside the U.S. would be much reduced.

Quite apart from this there can, of course, in the short term, be no room for complacency so long as the dispute in the U.S. copper industry itself remains unresolved.

On the other hand, taking a characteristically longer term view of the copper picture, Sir Ronald Prain has no doubt that, disregarding short term fluctuations, the general trend

of consumption must be upwards if only because of the direct effect on consumption of both world population trends and improved standards of living. "Provided," he says "that the industry is prepared to ensure that the price of copper is kept within bounds which will not encourage substitution, there seems no reason why copper consumption should not maintain and increase its characteristic growth factor The present over-supply is a temporary situation, and at reasonable prices the consumption growth of the future should be such that in the next decade it will test the ability of the mining industry to provide enough copper to meet this expansion. I am not apprehensive as to the industry's ability to do so."

WESTERN AUSTRALIAN IRON ORE

The Commonwealth Government has rejected the State Government's request for export licences for the shipping overseas of iron ore and will maintain the 21-year-old ban on export. Vigorous efforts are being made to locate new iron ore deposits, and the State Government emphasized this active search in support of its case. Despite this work, iron ore reserves are not extensive, and the country's demand for steel is growing. The resources of good ore in the Iron Range deposit appear to be limited, and doubt continues about the tonnage and grade of the Savage River deposits in Tasmania. The Commonwealth Government is adopting the correct policy in rigid conservation of the ore resources.

The Broken Hill Proprietary Co. has been carrying out pilot plant work on the taconites of the Middleback Ranges in South Australia. This work is believed to be proceeding successfully, and the very large tonnage of this material available would be a valuable addition to reserves, but its use in appreciable quantity will increase the cost of Australian steel. The Western Australian proposal was for the export of up to 15,000,000 tons from Koolyanobbing and Mount Goldsworthy deposits.

THE RARE EARTH METALS AS ENGINEERING MATERIALS

During the past two years the rare earth metals, under the leadership of yttrium, have attained increasing importance as useful engineering materials. The rare earth metals, or "lanthanons", comprise the 15 elements from lanthanum (atomic number 57) to lutetium (atomic number 71). Element 61, promethium, does not occur naturally, but one of its isotopes has been isolated from the products of nuclear fission.

Earlier this year it was announced that successful production of all the rare earth metals had been achieved in the United Kingdom. The metals are reduced from their fluorides with lithium, calcium or lanthanum in tantalum crucibles in an atmosphere of argon, and are then remelted in vacuum. All sixteen metals have been remelted into ingots or rods. Six of them, including lanthanum and cerium, have been successfully extruded and drawn to fine wire.

In the United States the many applications that are being found for the rare earth metals and their alloys are encouraging a rapid development of fabrication technology, according to recent statements by metallurgists and engineers of the U.S. General Electric Co. The processing of 100 lb. ingots of yttrium by extrusion, forging, rolling, swaging and machining is now established. The processing of related rare earth metals is assured in the near future.

Recent data obtained on higher purity yttrium indicates that metal of this quality has superior workability characteristics. There is evidence that other rare earth metals will

likewise be improved by increasing their purity. However, small additions of chromium, aluminium or vanadium can improve the cold workability of yttrium. All the heavy rare earth metals are reported to machine with the same ease as yttrium, except for cerium, europium and ytterbium. The latter three metals may require drilling operations suitable for very soft metals.

The only problem so far encountered in turning, milling, grinding, sawing, drilling and tapping rare earth metals has been the tendency of fine particles or chips to catch fire under conditions where sparking is caused at the working point. This hazard has been alleviated by flooding the work and cutting tool with an oil coolant.

According to Mr. K. M. Bohlander, of General Electric's Aircraft Nuclear Propulsion Department, yttrium and the rare earth metals are fast assuming prominence as potential nuclear power plant metals. It has been further stated that depending on the ability to translate pilot experiments into useful commercial-scale applications, the potentialities of rare earth additions to metal alloys may show great potentialities. Spectacular improvements in steel made by adding yttrium may hold the key to heat-resisting metals required for space flight and nuclear work.

UGINE SWITCHES TO NATURAL GAS

A notable event in the history of the French aluminium industry took place on November 17, when the first aluminium ingot produced with natural gas as the source of power was cast by UGINE. This company's Lannemezan plant in south-western France near the Lacq deposit is now converting its production to the use of natural gas. Not only are the ovens heated by gas, but the company is building a new pot-line which will receive electric power from the Artix power station, which is producing electricity with natural gas. This pot-line to be completed next January, will step up the Lannemezan aluminium production by 24,000 tonnes to some 35,000 tonnes.

A second completely new aluminium plant to use Lacq gas is being built by Pechiney at Nogueres-Moureux. Production is also scheduled to start next January, the rate being 56,000 tonnes a year. The Artix power station will have a capacity of 500,000 kW, half of which is earmarked for the Pechiney and UGINE aluminium plants.

It has been estimated that Western Europe's natural gas output will be roughly doubled by the early 1960's, the greater part of this increase coming from the development of the Lacq field and the linking of this field with consumer markets in Nantes, Lyons and Paris.

The development of this field will also have an important impact on world sulphur supplies. France will recover sulphur from natural gas at Lacq, and it is estimated that by 1961 a capacity of 1,300,000 tonnes of sulphur will be reached. Being a by-product, this sulphur will probably be produced at low cost.

DIFFICULT TIMES FOR PHILIPPINE MINING

In a review of the Philippine mining industry during the 1958-59 fiscal year, Mines Director Benjamin Gozon stated that mineral producers last year were handicapped by serious recessions in the foreign market and local tensions at home; but, he noted, the industry as a whole showed improvements despite these adverse conditions.

The gold mines, thanks to "blocked peso" buying, showed signs of eventual survival, said the report, but nobody was over-optimistic. A too sudden rise in production costs

could wipe out present price advantages. Base metals, as a group, did only moderately, as was to be expected. The export market was highly competitive, except perhaps for one or two items—refractory chromite and quicksilver. But even the U.S. market for refractory chrome, which is almost a Philippine monopoly, failed to take in as much tonnage, presumably due to overstocking. This situation is expected to improve if the present steel strike in the U.S. does not last too long. The country's metallurgical chrome and manganese producers may be facing a very anxious year against Indian and European competition.

Japan is making increasing purchases of iron ore elsewhere and this may affect the improvement in Philippine exports to that country. However, states the report, "local producers of iron have an ace in the eventual setting up of our own iron and steel industry". The non-metal group, with the exception of coal, made its best showing during the past fiscal year. It enjoyed a really expanding home market.

Total mineral production in the Philippines passed the 200,000,000-peso mark for the third consecutive year. Production during the 1958-59 fiscal year totalled 244,770,000 pesos, against 220,970,000 pesos during the preceding period: a rise of about 11 per cent. The percentage increase during the 1958-59 fiscal year over the preceding period was 24.

Last year's improvement in value was brought about mainly by increases in sales of gold, up by 5,900,000 pesos; copper, up by 13,000,000 pesos; iron, up by 2,600,000 pesos; cement, up by 5,400,000 pesos; and sand and gravel, up by 1,800,000 pesos. Losses came from refractory chrome, down 4,100,000 pesos; salt, down 3,400,000 pesos; and coal, down 1,000,000 pesos.

All metals showed increases in production volume, except lead and refractory chrome.

COAL TARGET FOR THIRD PLAN

The Planning Commission of India is reported to have tentatively approved the recommendation of the Working Group on fuel that the coal target for India's Third Five-Year Plan should be fixed at 110,000,000 tons. This figure is said to be provisional, but at this stage of formulation of the Third Plan it seems unlikely it will be substantially altered. The 110,000,000 tons target, which was also considered by the National Coal Council of India, means that new resources to the extent of 50,000,000 tons are to be developed during the Third Plan.

Meanwhile, Prof. Humayun Kabir, Minister for Scientific Research, Government of India, has stated in Calcutta that India's reserves of metallurgical coal are totally inadequate for the full utilization of iron ore.

Out of the total production of 13,000,000 tons of coal nearly 9,000,000 tons were consumed by the railways, which could use non-coking coals.

"Our immediate concern," said the Minister, "must, therefore, be to find some means of conserving coking coal without sacrificing efficiency. Constant researches have disclosed that high ash content coking coals could be carbonized and blended with different types of coking coal to yield desirable quality of metallurgical coal". Blending arrangements have already been undertaken at the state-owned steel plants, Rourkela, Bhilai and Durgapur. The Durgapur plant has accepted blending of 75 per cent of high volatile Raniganj coal.

The Bhilai plant has found ways to utilize 20 to 40 per cent of local coals, and at Rourkela the entire needs might be met locally from coals that have until now been used only for locomotives. These measures mean a considerable saving of money.

AUSTRALIAN MINE TAXATION—II

Taxation in Australian Mineral Development

RESIDENT shareholders in an oil exploration company have the choice open to them of claiming as a deduction from income a rebate either of one-third of calls paid on shares (Section 78(1) (b)) or of the full amount paid on shares (Section 77A). But, if the shareholders claim under Section 77A, the company must forgo an amount, equivalent to the shareholders' claim, in the deduction of capital from income (under Section 123A) should the exploration result in profitable oil yield.

Section 77A was introduced into the Act as recently as 1958, and the Treasurer has since stated that it will be subject to some amendment in the coming Budget session. Nevertheless, attention is drawn to one aspect of this new Section which is deprecated. That an allowance to one taxpayer, the shareholder, is openly contingent upon the surrendering of an allowance granted in recognition of actual expenditure by another taxpayer, the company, is a remarkable and almost sinister introduction into Australian taxation—it is a matter of interest that the idea was actually entertained by industry itself. It provides a precedent by which future claims for taxation allowance may become wide open to similar bargaining between different groups of taxpayers.

The allowance to the shareholder is of real value. He has little more than hope to sustain him in his gamble but the allowance permits him to throw his money down the drain without having to pay the further burden of income tax on it. The allowance goes about as far as any Government can go in directly attracting (virtually subsidizing) the investor to take part in this great gamble for a vital commodity. But, after making this valuable gesture in the national interest, Government then turns to the company and says that if, by great expense, hard work, and sheer luck you find something, then we make you, not the original taxpayer, responsible for the return of the allowance granted to him, to be followed by many years of income tax. Perhaps it might be pertinent to suggest that Government could look on the years of income tax as amply covering return on its allowance, in the same way as the shareholder hopes that dividends will ultimately provide ample return on his investment.

Of course, at this stage of oil development in Australia, the point is quite academic and rather one of principle. Yet it could be important to a company which became productive, for, right at the commencement of its productive operations when its finances are likely to be weak and when it should be building up its maximum reserves for its future operations, it will be paying income tax on money otherwise exempt under Section 123A.

But if it is so essential for Government to recover precisely the amount of allowance, then perhaps the proper place is under Section 44(2), which is concerned with allowances on income from dividends — presumably with such rewording as may be necessary to avoid administrative difficulties.

Exploration for Other Minerals

The allowance granted to shareholders in companies undertaking exploration, under Section 78(1) (b) which permits one-third of calls to be deducted from income, provides some incentive to exploration investment. It recognises the high risk attached to exploration; new mineral finds are rare indeed today and great sums are absorbed in prospecting. The allowance to the shareholder means that his loss is reduced to

The various sections of the Australian Income Tax Act concerned specifically with the mineral industry were summarized in tabular form in a previous article in *The Mining Journal*. The effect which these sections may have on investment in the mining industry is here reviewed.

the extent of the tax on one-third of the calls. From the Government point of view it may be claimed as one way of subsidizing exploration.

It is interesting to note that before the war the Commonwealth Government granted 100 p.c. allowance on calls, but no such allowance was generally granted by the States. On introduction of uniform taxation the Commonwealth Government adjusted the allowance to one-third as a reasonable compromise at that time.

There is, however, an anomalous relation between this Section and Section 123AA under which expenditure on exploration or prospecting (other than for gold or petroleum) may be deducted from income. Thus, under Section 123AA, a productive mining company can claim 100 p.c. of exploration expenditure as deduction from income. But if, instead of undertaking exploration out of income, it paid out that amount of expenditure as a dividend to its shareholders, and then called in an equivalent amount for exploration, the company would have paid out additional tax and the shareholders would have paid tax on two-thirds of the amount. In effect, the shareholders in a mining company are providing money for prospecting from their funds without paying tax on it, whereas the shareholders in a much more risky prospecting company pay tax on two-thirds of their contribution. Obviously, there can be little incentive under these circumstances for the formation of straight exploration companies. Likewise, there is little incentive for operating companies, whose profits cannot cover an expensive exploration campaign, to call up further capital for this purpose.

The anomaly would be removed if all share money contributed to prospecting were exempt — such an allowance, besides leading to greater investment in prospecting, would widen the field of available capital beyond the mining industry, to which today it is virtually limited.

The exemption under Section 23(p), of the profit from the sale of the right to mine a mineral prospect, is a sound incentive to prospecting. The exemption virtually recognizes the necessity for not detracting from the reward should the outcome of a highly hazardous gamble be successful. Important minerals excluded from the exemption are: lead, zinc, and iron ore — yet exploration for these minerals is encouraged under Sections 78(1) (b) and 123AA. There seems to be no logical reason why these minerals are excluded, they are as important to the country's development as any of the minerals to which the exemption applies.

A dividend received by a shareholder is exempt from tax under Section 44(2) (a) where the dividend is distributed by a

By Dr. J. A. DUNN

company from the proceeds of the sale of a prospect exempt under 23(p). This recognizes that the financial risk taken by the shareholder justifies the maximum reward, and places him on the same footing as the prospector.

Operating Mines

Calls. The deduction from income of one-third of calls paid by shareholders in mining companies, under Section 78(1) (b), as in prospecting, is a very real and valuable encouragement to investment in mining. From one point of view it may be regarded as reducing the shareholder's actual investment by the amount of the tax rebate, thus leading to a higher percentage return as represented by subsequent dividends. However, a deduction of this nature can be regarded as a means of eliminating the additional hazard of tax payments before capital has been recouped from dividends—we shall return to this very important aspect later.

Amortisation. In the tabular summary of the mining Sections of the Australian Income Tax Act, in the previous issue of this journal (Nov. 20, p. 509), Section 88 was conveniently included under "Amortisation", although it is not of course a part of Division 10 which relates to amortisation.

Under Section 88B, the parties to the sale of the mining lease may elect that that Section shall not apply to the premium on the grant or assignment of the lease. If they elect that Section 88B shall not apply then the purchaser may, under Section 88, write-off the lease cost over the remaining life of the lease, but the premium is included in the income on which the vendor pays tax (Section 84).

Generally, in the terms of such a sale, however, Section 88B would apply; the parties would agree that the vendor should claim the sale value tax free, and the purchaser would thus be unable to write-off the sale cost over the life of the lease. On the other hand, if a new prospect is sold the parties would elect against 88B as the sale value is tax-free to the prospector anyway under Section 23(p), and the purchaser can write-off the lease cost over the life of the lease under Section 88. It is difficult to justify this treatment of an old operating mine on a basis different from a new prospect. A lease in mining is very different from other forms of lease, for it grants to the miner an asset which he finally exhausts leaving the lease valueless.

We now come to that part of the Australian Income Tax Act, Division 10, which deals specifically with capital expenditure in mining. Sections 122, 122A, 122B and 123, provide alternative methods of amortisation of capital expenditure.

Capital Expenditure

Under Section 122 capital expenditure on plant, development, and housing and welfare may be deducted according to an amount ascertained by dividing the residual capital expenditure by the estimated number of years life of the mine up to 25.

Under Section 122A, plant and development may be written off in the year of expenditure. Under Section 122B, money appropriated for expenditure on plant and development in the next succeeding year may be deducted in the year of income.

Under Section 123, depreciation on a particular unit of plant may be made as in other industries under Section 54 if so desired.

These alternatives introduce a remarkable flexibility into the Act. They permit oversea companies the benefit of maximum write-off as between the taxation laws here and in the country of residence. An important intent is that they permit rapid write-off of part of capital expenditure. Nevertheless, these Sections do not permit the complete write-off

of capital expenditure on plant and development before the mine becomes subject to tax.

In the case of a new mine it is not possible for expenditure on plant and development to be recouped before the mine is subject to tax, as necessarily such expenditure on a new mine must come, under Section 122. Also, housing and welfare today require very heavy capital expenditure, and whether it is a new or a long-standing operating mine, this can be written-off only over a specified period.

Until the investor receives in profits or dividends the equivalent of his invested capital, the concomitant income tax adds to the high risk of the investment. This has been illustrated again and again in mining; many mines which have paid income tax during their life may terminate without returning either the full capital to shareholders or any interest on their investment. Almost invariably, capital equipment at a mine in an outback area has little or no sale value when the mine goes into liquidation.

To ensure that taxation does not add to the hazards of the ultimate return of capital to the investor would require that the provisions of Division 10 be pursued only a little further. This could be done by providing (as an alternative to existing Sections in Division 10 which should continue to meet the case of oversea companies) that all capital expenditure in a mine may be recouped before profits become subject to taxation.

The revenue surplus of an unsuccessful mine over a period of years may not total the capital investment; in such a case, the proposal would mean that taxation does not reduce the revenue before capital is recouped and so does not add to the financial risk as at present.

In the case of successful mines, the overall result would be no loss of Government revenue, for whatever taxation revenue exemptions may be allowed in the early years of the mine's life will be fully compensated after the initial capital expenditure has been recouped, and when capital deductions amount only to current capital expenditure.

If the principle were extended to all capital expenditure in the mineral industry, and not confined to expenditure on plant, development, and housing and welfare, it would include also such pre-production expenditure as exploration and purchase price of the mining lease, and such items as access roads, land acquisition for offices, housing and welfare, reservoirs and dams.

Where capital assets are sold subsequent to their partial or total recoupment, existing provisions for taxation recapture would continue to apply.

The above proposal refers to the miner, syndicate or mining company. The same principle may be applied also to the shareholders in a company. That aspect will be considered later in conjunction with taxation of shareholders' dividends.

Total Exemption

Gold and uranium. The exemption of the gold mining industry from taxation (Section 23(o)) dates back to the late 1920's, when the problems of a declining industry became appreciated. Although gold production showed some recovery in the 1930's and, to some extent, in post-war years, the difficulties inherent in the mining of a fixed-price commodity during a period of rising costs have required assistance in two ways — by continuation of the exemption from tax, and by the grant of a subsidy to near marginal mines.

The exemption of uranium mining from income tax (Section 23D) recognizes the importance of uranium in the modern economy and the need to encourage exploration for and development of new deposits. The exemption is granted until 1965.

Selenium and Tellurium

SELENIUM, a by-product of the electrolytic refining of blister copper, is one of the semiconductor metals widely used in the electronics industry. Although Canada's 1958 production, exports and consumption rose above the 1957 figures, producers' stocks continued to increase, and the consumption and export figures remained low compared with those of the peak years, 1955 and 1956.

The increase in production can be attributed to increased copper production from the Manitouwadge, Chibougamau and Gaspé mines, while the continued depression in consumption and exports is a reflection of the 1958 business recession combined with increasing competition from ultra-pure silicon and germanium in the electronics field.

The only companies producing primary selenium in Canada are Canadian Copper Refiners Limited at Montreal East, Quebec, and The International Nickel Company of Canada Limited at Copper Cliff, Ontario, and Port Colborne, Ontario. Some selenium is also recovered from scrap left over in the manufacture of rectifiers and from old rectifiers. Production increased in 1958 to 403,264 pounds from the 321,392 pounds produced in 1957. At 349,424 pounds, production of refined selenium in 1958 was 17,413 pounds over the 1957 figure.

The largest selenium metal-and-salts plant in the world is operated by Canadian Copper Refiners Ltd. at Montreal East, Quebec. This plant, with an annual rated capacity of 450,000 pounds of selenium, is equipped to produce commercial-grade selenium metal (99.5 per cent Se), high-purity (H.P.) selenium metal (99.99 per cent Se) and a wide range of metallic and organic selenium compounds. The selenium originates in the copper anodes produced at the Noranda and Murdochville smelters in Quebec, and in blister copper from the Flin Flon, Manitoba, smelter. In addition to the selenium metal, the most important compounds produced are selenium dioxide (71 per cent Se), sodium selenate (41 per cent Se), sodium selenite (45 per cent Se) and ferroselenium (55-75 per cent Se).

Copper anodes produced from the nickel-copper ores of the Sudbury district of Ontario are the source of the selenium obtained at the Copper Cliff and Port Colborne refineries of The International Nickel Co. of Canada Ltd. This company's selenium refinery has an annual rated capacity of 240,000 pounds of minus 200 mesh, 99.7 per cent selenium powder.

Consumption and Uses

Selenium and/or selenium compounds are used in the electronics, glass, rubber and alloy-steel industries and as pesticides in agriculture. The electronics industry accounts for the major use of selenium for the production of dry-plate rectifiers and photoelectric cells. High-purity selenium is used for electronic applications. Selenium dry-plate rectifiers have the advantages of high electrical efficiency, compactness, long life, light weight and ruggedness. They are used in many industrial applications in radio, television, battery chargers, electroplating equipment, magnetic brakes, shakers, agitators and circuit breakers. In the rectifier field, selenium is encountering increasing competition from ultra-pure silicon and germanium. In the manufacture of photoelectric cells, selenium is being replaced by other materials which are able to develop a larger amount of current. High-purity selenium is also used to coat the plates used in xerography, a dry-print

Canada is one of the two leading producers of both selenium and tellurium, the other being the United States. This article is extracted from "Canadian Mineral Industry", Review 19. The author is A. F. Killin, Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa.

process in which use is made of the photoelectric properties of selenium.

In the manufacture of glass food containers, commercial-grade selenium powder is used in conjunction with arsenic compounds to produce white or "flint" glass by the neutralization of the green tints imparted to the glass by iron impurities. Selenium is also used in the bright-red ruby glass used in stop-lights and signal lights, in marine applications and in decorative tableware. The power of selenium to impart orange-to-dark-maroon colours to ceramic material is also utilized by the pigments industry for the colouring of glaze for chinaware, pottery, plastics and vitreous-enamel cover coats and the colouring of printing inks for glass containers. In the rubber industry, commercial-grade selenium is used to increase heat, oxidation and abrasion resistance and to speed up the rate of vulcanization. The pharmaceutical industry employs selenium in the preparation of selenium sulphides which are claimed to control dermatitis of the scalp in humans and of the skins of animals.

Sodium selenate has been used as a systemic insecticide in greenhouses, but this use is declining owing to the discovery of compounds which are easier to apply.

Ferroselenium is used as an additive in the production of certain grades of stainless-steel alloys to improve the machinability and porosity of the castings without affecting corrosion resistance and working properties.

Tellurium

Canadian tellurium production is also obtained as a by-product of the electrolytic refining of blister copper by The International Nickel Company of Canada Limited at Copper Cliff, Ontario, and Canadian Copper Refiners Limited at Montreal East, Quebec. Although tellurium also occurs in gold, silver and lead ores, none is recovered from these sources in Canada.

International Nickel's source of tellurium is the copper-nickel ore of its deposits in the Sudbury area of Ontario. The major source of the tellurium produced at Canadian Copper Refiners' Montreal East refinery is the blister copper obtained from the smelter of Hudson Bay Mining and Smelting Co. Limited, at Flin Flon, Manitoba. Hudson Bay mines copper-zinc ore from its property on the Manitoba-Saskatchewan boundary. Some tellurium is also recovered from anodes produced at the Noranda copper smelter from the treatment of Quebec ores, and it is probable that some is recovered from anodes produced at the smelter of Gaspé Copper Mines Limited at Murdochville, Quebec.

Production of tellurium in Canada during 1958 increased to 43,278 pounds from the 31,524 pounds produced in

1957. The metal could be produced in much greater quantities if a market could be found for it.

Other world producers of tellurium are the United States, Australia, West Germany and Sweden.

Consumption and Uses

Tellurium compounds absorbed into the body by contact with the skin or inhalation of dust and fumes give the breath a strong garlic odour which persists up to three months after exposure. For this reason, industry has not exploited the full potential of this metal. Tellurium production almost always exceeds demand, but recent developments in the electronics industry have stimulated interest in the metal. If labour problems connected with its handling are solved, expanded uses and markets can be expected.

The rubber industry probably provides the largest single outlet for tellurium. When added to natural or synthetic rubber, tellurium increases the rate of vulcanization, improves the ageing and mechanical properties and increases resistance to heat and abrasion. One of the principal uses of this improved rubber is in the insulation of portable cables for mining, dredging and welding. Another is in the manufacture of special conveyor belting.

Tellurium in the form of controlled-size pellets is used to improve the properties of copper and iron. A 99.5 per cent copper, 0.5 per cent tellurium alloy is found to have excellent thermal and electrical conductivity and good machinability. It is used in the manufacture of welding tips and the mass production of electrical connections.

Small amounts of tellurium added to iron castings are used to control the depth of chill in order to produce a hard, abrasion-resistant surface.

Tellurium added to lead increases its corrosion resistance and hardness and makes it suitable for use as tank-lining and piping for handling sulphuric acid. An alloy of tellurium and lead is sometimes used in the manufacture of submarine sheathing for electrical cables.

The ceramic and glass industries use tellurium to impart blue to brown colours.

Tellurium chloride or tellurium dioxide in hydrochloric-acid solutions imparts a permanent black antique finish to silverware.

Recent advances in electronic science have increased the interest in ultra-pure tellurium for semiconductor and other electronic uses. Research into methods of producing high-purity tellurium is being conducted by producers of the metal. In the field of thermoelectronics, bismuth-tellurium thermocouples have been used for the direct conversion of heat into electricity and for cooling applications by passing an electric current through the thermocouple. These applications are still in the experimental stages.

Prices

The price of tellurium metal in the United States was quoted by E. and M. J. Metal and Mineral Markets at \$1.65 to \$1.75 a pound throughout 1958.

Non-Ferrous Metals in Brazil

A Survey of Production, Consumption and Future Needs

THE rapid expansion of Brazil's motor car, electrical manufacturing and heavy engineering industries is swelling the demand for non-ferrous metals, the bulk of which must still be imported. Dr. Amyntas de Moraes, president of Metminas S.A., in an address to the Society of Engineers at Belo Horizonte,* quoted the following estimates of present and future consumption in tonnes:

	1957	1960	1965
Aluminium	19,000	42,000	57,000
Lead	20,000	40,000	60,000
Copper	39,000	60,000	94,000
Tin	2,000	2,500	3,500
Nickel	600	3,000	4,000
Zinc	20,000	37,000	51,000

To aid in meeting the growing demand, the Department of Mineral Production (DNPM) is speeding up investigation of known deposits and prospecting for new occurrences either directly or in co-operation with the concessionaires and land-owners. In Bahia the deposits of lead at Santa Se, those of Boquirá, in Macauba, and the occurrences of copper at Caraiá, in Caravellas, were exhaustively examined last year. In reporting on the work done Dr. Avelino Ignácio de Oliveira, the Director General, said he hoped that the Boquirá deposits alone would satisfy Brazil's needs of lead within the next two years.

In Minas Gerais DNPM's activities included examination of the following occurrences: lead and associated minerals in the Januária, Itacarambi and Zontra zones; copper ores in the Moeda area; alluvial and pegmatite deposits of cassiterite

and tantalite at São João del Rei and Nazarene and bauxite and zirconium at Pocos de Caldas.

Zinc

Production amounted to 60 tonnes in 1958, imports to 23,226. Cia. Niquel Tocantins, concessionaire of the Vazante deposits, is preparing to mine and concentrate the ore through its associate, Cia. Mineira de Metais. Production at the rate of 18,000 tonnes annually, should start in 1961 (see *The Mining Journal*, September 18, 1959). The next stage will include processing of sulphurated ores and recovery of associated metals.

Dr. Amyntas de Moraes estimated the Vazante reserves of surface ore at over 5,000,000 tonnes of hydrate and carbonate of zinc, with 30 per cent in the oxidated mineral. The underground ores, of greater volume and more complex, contain zinc, lead, silver, copper, cadmium and antimony. The occurrence extends for eleven miles and includes the Lapa Nova, Varginha, Lumiadeira, Salobo and Ouro Podre mines.

The Januária deposits, in northern Minas Gerais, comprise eight mines, scattered along the banks of the São Francisco River. These rich zinc ores are associated with lead, silver, copper and vanadium. The Janelão and Mina Grande deposits in Itacarambi have proved reserves of over 650,000 tonnes of zinc minerals. One of these mines is worked by Cia. Inga, as described in *The Mining Journal* of February 6, 1959.

Industrias Votorantim S.A. announces plans to instal plant near the Três Marias hydro-electric station and produce initially 30,000 tonnes of electrolytic zinc and 10,000 tonnes of zinc oxide.

**Engenharia, Mineração e Metalurgia*, March 1959

Lead

Brazilian production increased from 6,718 to 8,000 tonnes in 1958, while imports dropped from 20,752 to 11,927 tons. Three firms are now producing lead: i.e. Plumbum S.A., in Parana, Tonelli S.A. and Acumuladores Prest-O-Lite in Sao Paulo; the first-named owns deposits at Panelas and Furnas, the others process Bahia ores. Prest-O-Lite is about to operate plant at Santo Amaro da Purificacao, Bahia, processing ore from the Boquira mine and producing 14,400 tonnes of lead at the outset. This recently-discovered mine yielded 2,650 tonnes of oxidized mineral with 50 per cent lead in 1957. Exploitation is economical, with open-cast working, and the band of ore, varying from 6 to 10 metres in thickness, is 2,000 metres long.

Another important lead mine, with reserves of 1,000,000 tonnes of galena, has started production at Blumenau, Santa Catarina, the ore being processed by Cia. Mineira Sul-Brasileira.

Copper

National production increased from 730 tonnes in 1955 to 5,000 in 1958, while imports dropped by 2,195 tonnes last year, to 27,340.

Plant recently installed at Itapeva, Sao Paulo, is producing 300 tons of black copper monthly, output to be raised later to 2,000 t.p.m. The mineral is refined electrolytically by Industrias Pignatari at Utinga, Sao Paulo. DNPM continues to extract copper electrolytically from the Seival deposits of Rio Grande do Sul, obtaining between 93-98 per cent of the metal content with reduced power and without using sulphuric acid.

The mineralized district of Caraiba, in Bahia, comprises a group of deposits containing several million tonnes of ore with 1.5-3 per cent copper.

Of Brazil's eleven registered copper mines the following are deserving of mention: Santa Blandini, which started producing in 1958, has estimated reserves of over 200,000 tonnes of economically workable ore, averaging 5 per cent cu., and a much larger tonnage of mineral similar to that of Caraiba, the vein running to a depth of 975 feet. Pedras Verdes (Ceara), idle until 1958 owing to legal proceedings; Picui (Paraiba), Grajau (Maranhão), Ipanema (Minas Gerais) and Camaqua (Rio Grande do Sul).

Aluminium

Production in 1958 was 10,000 tonnes, imports 14,407. The two producing companies, Eletro-Quimica and Cia. Brasileira de Alumínio, aim to supply the market with 67,500 tonnes in 1968, provided adequate electric power is available. Reynolds Metals and Kaiser Aluminium propose setting up reduction plants within the area served by the Paulo Afonso Hydro-electric station and the Byington-Hanna group plan to invest U.S.\$200,000,000 in plant in Minas Gerais.

The most valuable of Brazil's 34 registered bauxite mines are in the Ouro Preto and Pocos de Caldas regions (Minas Gerais). In the latter area tenders are being invited to exploit 226,500 square metres of deposits, the property of the Municipality. DNPM reports that the mineralized zone at Retiro Branco, Pocos de Caldas, extends over several square kilometres and that the bauxite, of excellent quality, exists in slabs up to 15 metres thick. Kaiser Aluminium is prospecting for bauxite at Almeirim, Para.

Tin

The situation as regards mining and industrialization of tin minerals was described in *The Mining Journal* of April 3,

1959. Owing to the high cost of exchange certificates official imports of cassiterite and tin dropped to 333 and 27 tonnes, respectively, in 1958, but large supplies were smuggled in from Bolivia through Puerto Suarez, where customs control is almost impossible. In May last Cia. Estanifera was authorised to import 800 tonnes of Bolivian concentrates at a privileged exchange rate.

Nickel

Imports dropped last year by 112 tonnes, to 387. As reported in *The Mining Journal* of September 25, 1959, Cia. Niquel do Brasil, the only producer, marketed 288 tonnes of ferrous-nickel, containing 72 tonnes of pure Ni, in 1958 and will increase output when adequate electric power is available. Dr. Amyntas de Moraes reports that recent soundings prove that the reserves of the Company's Liberdade mine greatly exceed the original estimate of 300,000 tonnes, with an average of 1.8 per cent of silicated mineral, type garnierite.

Cia. Niquel Tocantins has completed plans to exploit its deposits at Niquelandia, Coias, with probable reserves of 20,000,000 tonnes of 4.5 per cent Ni and natural concentrations of 12 to 16 per cent ore in some mines. Copper and cobalt will be mined as sub-products. The Company plans to reduce the ores and concentrate the nickel, in the form of ferrous-nickel, by Krupp type of rotary furnace or electric reducing furnace. A hydro-electric station will have to be built on the Tocantins River.

Geology of Australian Antarctica

THE first major geological study of Australian Antarctica since the war has now been published and is a valuable scientific document adding to human knowledge of regions about which much still remains to be discovered.

As Bulletin No. 52 and entitled "A contribution to the geology and glaciology of the Western part of Australian Antarctic Territory", it is published by the Bureau of Mineral Resources in the Department of National Development jointly with the Antarctic Division of the Department of External Affairs. The author is Mr. P. W. Crohn, of the Bureau's staff, who bases the report on two years' work in the Antarctic, while a member of the Australian National Antarctic Research Expeditions at Mawson. In that time he spent a total of nine months away from the camp on field work. He travelled by tracked vehicles called weasels, by dog sledge, and in his second year by light aircraft also. His longest journey was an 850-mile round trip which took almost three months.

The wide dispersal of the outcrops of rock, the lack of time for thorough field examination and severe climate and travelling conditions make the study of Antarctic geology peculiarly difficult. However, the author of the bulletin managed during his stay to visit many of the scattered rock outcrops in Australian Antarctica north of latitude 74 degrees South and trace a coherent story in them.

Geologically, the area examined is of interest. The rock outcrops include a sequence of fresh water sediments containing coal seams which are similar in age to some of the coal seams around Newcastle, N.S.W. No mineral deposits of economic importance have so far been discovered in the area. However, traces of copper, iron, manganese, coal and radio-active minerals occur at several places.

The work which forms the basis of Mr. Crohn's report was all done before most other countries had set up their International Geophysical Year bases in Antarctica.

MINING MISCELLANY

The third large coal-washing plant to be completed in China since the start of this year is stated to have been brought into operation at the end of October at the Northern Chinese Taiyan site. This plant, built with Polish technical assistance, is reported to be able to process some 2,000,000 to 3,000,000 tonnes of hard coal per year; this coal will then be passed to the Taiyan and Paotow steel plants. The two other large-scale units to have been installed in the current year are at Matow and Chuchow. The Matow plant, built with Russian help, has a throughput capacity of some 1,800,000 tonnes annually and that at Chuchow, built with Polish aid, has a 2,000,000 tonnes annual capacity. According to the head of the Chinese Economic Council, Mr. Po-I-Po, a great many smaller washeries were also erected in the first nine months of this year; so many, in fact, that together with the larger units, some 24,500,000 tonnes processing capacity was added in the first three quarters of 1959 to China's national figure.

According to the main iron ore mining concern Erzbergbau Siegerland A.G. of Betzdorf, in the ore-rich Siegerland area of West Germany, the poor market conditions which prevailed from the middle of 1958 are continuing, with no signs of improvement in the near future. Reductions in freight rates have resulted in foreign ores becoming cheaper in Germany than native Siegerland ores. Production costs also were higher in this area, than in those of other exporting ore countries, which meant that, despite extensive rationalization measures adopted in the past few years, cuts in price were not possible. Erzbergbau Siegerland further states that their ore is mined at a depth of 2,500 ft., while most of the foreign mines are opencast operations.

Conwest Exploration Co., which is actively prospecting in Nova Scotia, reports a medium to low grade zinc occurrence in Breton Island. Details are not yet available, but the deposit, which could be worked by open pit mining, is on high ground, and ideally located with respects to transportation. It is on a property covering 4 sq. miles (64 claims) near southwest end of Bras d'Or Lake, in the Lime Hill district near the southern tip of the island.

The Dansk Mangansulfatfabrik Co., in Denmark, which operates a manganese sulphate plant in Boulderslev, South Jutland, has recently established a subsidiary company, the A/S Dansk Tung-Sand Industri, to extract zircon, magnetite, ilmenite, garnet and titanium minerals from sand deposits along the coast of the northern part of the peninsula of Jutland. The extent of the deposits is not known; however, they have been examined in co-operation with Denmark's Geological Research Department. The new company is constructing a plant with an estimated productive capacity of about 15,000 tons of heavy sand a year. The plant, estimated to cost 500,000 kroner, will employ 30-35 people.

A new sulphur plant in Machow, Poland, is expected to be ready for use next year. The plant is planned for an

initial capacity of 100,000 tonnes of refined sulphur annually, which is to be raised to over 400,000 tonnes by the end of the next Five Year Plan. The site for the mechanical processing, the steel construction and frame for the electric heating plant should be ready by the end of this year. At present the ore is being refined in an experimental laboratory in Ogorzelec, Lower Silesia.

The Iranian Government and the West German concern, Demag, have signed what is referred to as an advisory agreement for ore mining activities in Iran. The agreement concerns the exploitation and use of Iranian iron ore and hard coal, to be used in the Azna steelworks in Iran, which is planned to have an annual capacity of 200,000 tonnes.

At the Government of Ghana's request, Russian specialists will be sent to Accra to examine the possibilities of setting up an ironworks there. If this plant is to be built, it will be erected with Russian assistance.

A geological unit working in Madras State has discovered what is claimed to be the first large deposit of titanium ore near Ketty in Nilgiris. Bauxite deposits, similar to those in the Salem district of Madras, with known reserves of nearly 2,000,000 tons, have also been discovered in several places, and prospecting has also disclosed some different types of iron ores and clay suitable for firebricks.

Large deposits of beryl are reported to have been found by a Pakistan-German commercial firm in the Hazara district of Pakistan after an organized survey of the area. Deposits of graphite, copper, lead and zinc are also reported, in the same locality, at heights of from 13,000 to 18,000 ft. For most parts of the year these areas are covered with snow.

PERSONAL

Mr. Noel Gee, M.C., has been appointed staff director of the East Midlands Division of the National Coal Board, in succession to Mr. P. M. D. Roberts, who recently returned to N.C.B. headquarters in London. Mr. Gee is at present Director of Public Relations of the Board.

Mr. F. A. Ross, Mr. W. G. A. Jenkins and Mr. J. Higginbotham have been appointed directors of Edgar Allen & Co. Ltd.

Mr. G. Zitter has been appointed a director of Blackwood Hodge.

Mr. C. E. Hutchinson has been appointed Home Sales Manager of Mining and Quarry Plant Division at Pegson Ltd., to operate from head office at Coalville, Leics. Mr. A. Suttill has been appointed chief sales engineer, export division, at the London office.

Mr. John C. George, C.B.E., M.P., has resigned from the board and chairmanship of Joy-Sullivan Ltd., consequent on his appointment as Parliamentary Secretary to the Ministry of Fuel and Power.

Mr. Frank J. Zmarzly has been appointed Doncaster works manager of International Harvester Co. of G.B. Ltd., in the place of Mr. J. D. Abell, who is returning to Canada to the company's Hamilton, Ontario, office. Mr. S. L. Sonander will succeed Mr. Zmarzly as Bradford works manager.

British Jeffrey-Diamond Ltd., of Wakefield, announce that Mr. C. F. Adams has been appointed to the board of directors. Mr. Adams has been with the company for 22 years, and was recently general manager of the Crusher and Industrial Division.

The election has been announced of Mr. Joseph L. Fisher as president and executive director of Resources for the Future Inc., to succeed Mr. R. G. Gustavson who retired recently, but will remain on the board of directors. Mr. Irving K. Fox, director of water resources studies, was elected associate director.

COMPANY NEWS

The Consolidated Pneumatic Tool Co. Ltd., are opening a new district office in Bristol next week to serve the West of England. The company's branch office at Bridgend, Glam., will continue to serve the South Western district.

Mr. Wahabi Bandele, a Nigerian engineer employed by the Nigerian Tool and Die Co. Ltd., agents of Atlas Copco AB in Lagos, has been in Sweden for three months training as instructor-service engineer, and will be returning to Nigeria to train Africans in the use of Atlas Copco products.

On January 1, 1960, the British Thomson-Houston Co., Metropolitan-Vickers Electrical Co. and Siemens Edison Swan Ltd., change their names to Associated Electrical Industries (Rugby) Ltd., Associated Electrical Industries (Manchester) Ltd., and Associated Electrical Industries (Woolwich) Ltd. respectively.

At the same time five new Product Divisions of Associated Electrical Industries are announced. They are as follows:—

1. Cable Division

2. Construction Division

These combine the interests of the S.E.S. Cables Division with those of W. T. Henley's Telegraph Works Co. Ltd. and Liverpool Electric Cables Ltd.

3. Telecommunications Division

4. Radio and Electronic Components Division

The Telecommunications Division has hitherto traded as a Product Division of Siemens Edison Swan Ltd.

The four Divisions mentioned so far will be managed by Associated Electrical Industries (Woolwich) Ltd. (formerly S.E.S.).

5. Instrumentation Division

This Division combines the interests of Sunvic Controls Ltd., with the Instrument and Meter, X-ray, and Scientific Apparatus departments of Metropolitan-Vickers and will be managed by Associated Electrical Industries (Manchester) Ltd. (formerly M-V.).

Birlec Ltd., the heat treatment and furnace manufacturing company, will be renamed A.E.I.-Birlec Ltd., and will be managed by Associated Electrical Industries (Rugby) Ltd. (formerly B.T.H.).

Machinery and Equipment

A New Pneumatic Loader

Showing greatly improved safety factors when compared with older equipment, two new types of patented pneumatic loaders for 22 and 25 mm. cartridges have been developed by Nitroglycerin AB, Gyttopp, Sweden, for plastic and powdered explosives. One has a flexible plastic tube and the other a tube of brass and a selected aluminium alloy. Used to a great extent for loading ordinary drill holes with diameters of between 30 and 75 mm., they are claimed to be particularly suitable for loading long holes and drill holes under water. Compared with ordinary rod-tamping, this pneumatic loading permits, in many cases, an increase of 20 to 40 per cent in the degree of packing of the explosive. This implies that the burden can be increased and the cost of drilling reduced.

Both types of loaders have been approved in Sweden by the Royal Workers' Safety Board for use under prescribed conditions. To ensure satisfactory working of the loader the cartridge diameter should be 24.6 ± 0.3 mm. for S25 and R25 and 21.6 ± 0.3 mm. for S22 and R22.

Known as S22-T4 and S25-T4, the loaders with polythene tubes are approved for use in water-logged, as well as dry holes, with Extradynamite LFB, LFIV, LF60 (gelatinized ammonium nitrate dynamites with 35, 50 and 60 per cent nitroglycerine-nitroglycol respectively), blasting gelatine and the safety explosives Borenite, Nabite, Nitrolite and Securite, as well as others which are at least equivalent to these from the point of view of safety.

The loader consists of a reducing valve, with claw coupling for connection to a pneumatic air system with a maximum pressure of 10 atm., set to give off air with 3 atm., overpressure and incorporating a safety valve with whistle; a $\frac{1}{4}$ in. dia., 33 ft. long pneumatic hose connecting the reducing valve, the air valve and the breech piece; a three-way type air valve which is usually placed at the middle of the pneumatic hose; a metal, slightly funnel-shaped breech piece T4, which is closed automatically by a lid when the compressed air is turned on; an intermediate tube placed between the breech piece and the connecting tube to facilitate cartridge loading, which is 6 ft. in length and holds about 12 cartridges; a plastic loading tube, the inside of which has longitudinal grooves which prevent an undesirable rise in pressure if a cartridge should get jammed, e.g., should the tube become squeezed; and a jet which consists of a short tube and a socket of the same material as the plastic tubing and three knives. The internal diameter of the jet is approximately the same as that of the cartridge. The three steel knives are placed in a groove and kept in position by the socket, which is welded along the front and back edges.

Special instructions are given for changing or replacing any of the component parts of the loader.

This type of loader possesses the ad-

vantage of the tube being in one piece and not in parts which have to be put together and taken apart when loading. The plastic tube is inserted in the drill hole until its jet reaches the bottom. The cartridges are slipped into the tube through the open breech-piece, the end with the red mark being inserted first. This is of great importance since the air current can otherwise rip off the paper and the dynamite will coat the walls of the tube. Between 20 and 40 cartridges are loaded and packed into the hole before another lot is added. Finally, the blasting cap can be passed down.

The loaders with metal tubes, types R22-T4 and R25-T4, are approved for loading dry drill holes with Extradynamite LFB and other dynamites with a content of nitroglycerine-nitroglycol lower than 40 per cent and at least equivalent from the point of view of safety, and the safety explosives Borenite, Nabite, Nitrolite and Securite and others at least as safe as these. In waterlogged drill holes it is also approved for Extradynamite LFIV, LF60, blasting gelatine and others with 40 per cent or higher content of nitroglycerine-nitroglycol and at least as safe.

These types R22-T4 and R25-T4 each consist of a reducing valve, a pneumatic hose with air valve, a breech-piece T4 and a loading tube made up of a jet-tube, a number of aluminium alloy extension tubes with brass jointing and locking sleeves and a connecting tube to the breech-piece. The jet tube is of brass, the fore end being constricted and holding three knives of rustless steel which cut the cartridge papers longitudinally.

When using the loader under water it is as a rule advisable to use metal loading tubes. The use of the pneumatic loader has the great advantage that the

actual work of loading can be carried out above water.

A DETACHABLE PROP BASE

A detachable prop base which reduces the amount of floor penetration by rigid steel props under load has been designed in the No. 3 area, East Midlands Division, N.C.B. It has been used with success at several collieries in that area.

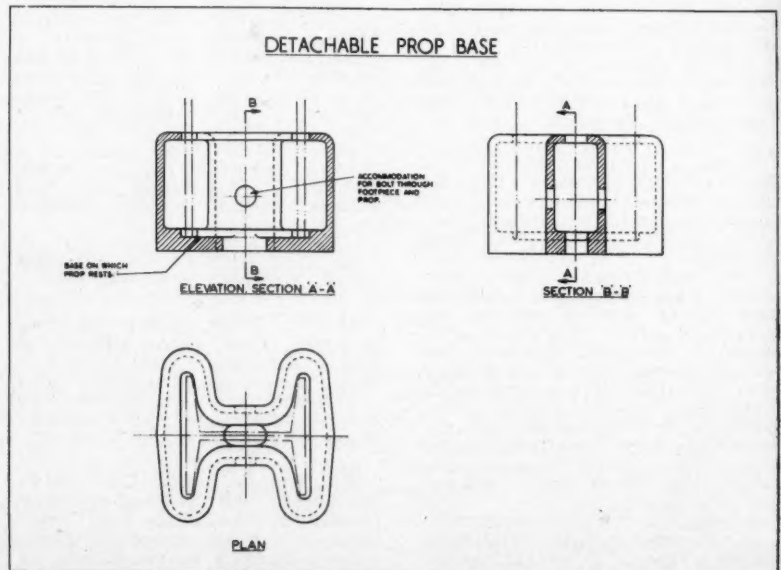
The device operates on the principle that resistance to floor penetration depends not only on the cross section of the prop bearing on the floor, but also on the perimeter of the base of the prop, since there is also a vertical shear resistance to penetration. The drawing below shows how the design achieves a much larger length of perimeter at the base, and larger cross sectional area, than the prop which it supports.

The base consists of a mild steel shell, designed to receive the "foot" end of an H-section rigid steel prop. The size of the shell is variable, depending on the section of prop involved. The prop rests on the base of the shell and is attached and retained in position by means of a bolt which passes through the shell and the web of the prop.

GISMO USED FOR MUCKING

Since the short description of the Gismo mucking system appeared in *The Mining Journal*, page 368, for October 16, 1959, some further details have been received in respect of a Gismo Transloader now in use at the Grandview lead-zinc mine of American Zinc, Lead and Smelting Co., Metaline Falls, Washington, U.S.A.

In order to place mining operations on an economic footing at this mine, it became necessary to evolve a mechanized drilling and mucking system to fit in with the already established rail haulage system which utilized 7-ton bottom dump cars. To this end, a Gismo self-loading transporter was brought into service for mucking. This



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consisted of a large crawler-mounted shovel powered by an HD-5 Allis Chalmers diesel crawler tractor which was capable of moving up to 400 tons of material on short hauls of up to 300 ft. one way during one 8-hour shift. A drill jumbo was also developed from this Gismo transporter by means of which two men could drill out a 400 s.ton heading round a 400-800 s.ton slabbing round during an 8-hour shift.

Further to reduce maintenance and development costs and to increase the range of the Gismo self-loading transporter, both the power unit and the shovel were subsequently put on pneumatic tyres by the manufacturers, the Sanford-Day Iron Works, Tenn. This changeover increased the operational range of the machine, which was now called a Transloader, to over 2,400 ft. per round trip.

Capable of moving at up to 20 m.p.h. in either direction, this new one-man operated, four-wheel, self-loading and self-dumping Transloader has three speeds, forward or reverse, with directional travel lever. Eliminating the need to synchronize or position several pieces of equipment to load, it can back-fill or dump directly into bin or ore pass or by simple ramps over trucks, cars, conveyers, etc., and can move large boulders for secondary blasting. In drilling operations, it can clean up all fly rock from the blast at the working face; completely muck out a round, leaving little or no hand mucking to be done before the next round; haul the muck to dump stations from one or more headings to facilitate ore blending; and maintain its own roadway, digging in below grade, at the operator's option, to keep a level and clean haulage-way regardless of the bed condition.

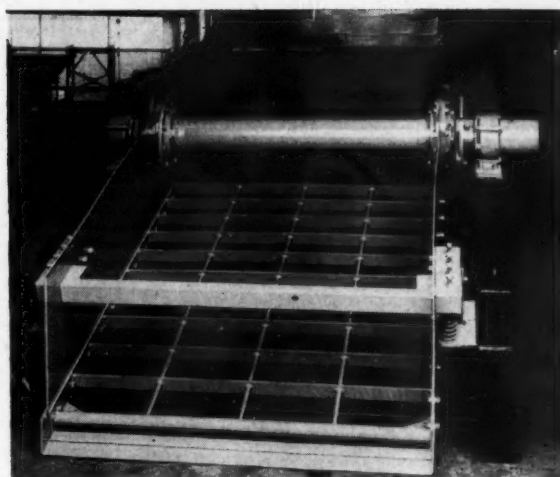
At the Grandview Mine of the American Zinc, Lead and Smelting Co., the muck is hauled from the face by the Transloader and dumped into centrally located rises. Every effort is made at Grandview to keep the access roads on not more than a 14 per cent grade, though some grades in the mine reach a steepness of 24 per cent depending on the location of the orebody, where mining is developed either up or down dip as necessary.

The stoping method of mining is practiced with the open stope and casual pillar and development headings are calculated to intersect the top 20 ft. of the orebody. Development headings driven in waste rock measure 10 ft. x 10 ft., but, in the ore, they are generally 12 ft. x 12 ft. With the development of the orebody, heading rounds are kept to a minimum.

From the ore chutes in the centrally located raises, the muck is pulled into 7-ton bottom dump rail cars, which run on a track 500 ft. below the main haulage level, and eventually dump direct into a skip used for hauling the muck up a 22 deg. slope to a storage pocket. Thence the muck is hauled to crusher storage bins at the mill.

When the Transloader is used for mucking out the headings on the extension of lateral track haulage, it then dumps directly into the ore cars, a two-section ramp being left on the end of the track to which the ore cars are coupled. The Transloader then runs up the ramp and down a flat ramp at the outer sides of the string of cars. Large boulders are picked up on the dipper of the Transloader and removed for secondary blasting.

Niagara vibratory screen type E.10 equipped with Tenemax piano-wire screening surface



Considerable savings are already claimed to have been made at Grandview as a result of the use of the new Transloader, which was put through severe trials during its initiation period. The previous tons-per-hour mucking factor has been more than doubled and this has enabled the company to eliminate one tractor operator with a saving of 20 per cent in mucking man-hours alone.

During tests, slopes of from 11 to 16 per cent down-grade were encountered and there were many large boulders included in the spoil. To completely muck out and clean out a round, over a one-way haulage distance of 480 ft., 50 trips of the Transloader were necessary and the average round trip travelling time was 2.44 min. The average loading time per load was 1.09 min. and the average time for dumping, which is controlled hydraulically, was only 3 to 5 secs.

Maintenance costs are not expected to rise above 11 c. per ton during the life of the Transloader and an additional 4 c. a ton is expected to be enough to cover the future overhaul and repairs necessary for prolonged usage.

PIANO-WIRE SCREENING SURFACE

Vibratory screens, manufactured by Niagara Screens (Great Britain) Ltd., have a long and highly satisfactory record of service in the colliery industry. Machines supplied over 20 years ago are still operating with maximum efficiency and require the minimum of maintenance. Whilst the majority of "Niagara" units supplied to the coal industry are operating in the United Kingdom, the experience gained in all aspects of mechanical handling and screening has enabled the company to develop a range of machines that can be used in all areas of the world, even under the most difficult conditions, with very little maintenance. In fact, the "Niagara" Vibratory Screen is so robust that, apart from regular lubrication and an occasional change of screening surface, little attention is necessary.

The company has recently produced a new piano-wire Screening Surface, which has the merit of strength allied to a very high open section area. This type of mesh is now in full production and can

be supplied down to 3/32 in. width of aperture. The Piano-wire Surface known as "Tenemax" (Registered Trade Mark) has found a ready application in the colliery industry and has been successfully employed extracting damp "fines" from coal before washery, and for removing "fines" from stocked coal. A typical "Tenemax" surface, in a Niagara Screen, is shown in the accompanying photograph.

A specially designed mild steel frame is fitted with piano wires stretched end to end. Each wire is individually tensioned by means of a separate peg in a specially-designed tensioning board. A suitable key is provided with every surface for this purpose. A guard plate is incorporated to direct the feed away from the tensioning board. Transverse flats with accurately machined recessed guides support the wires and when the wires are in tension the aperture is rigidly retained. Owing to the fact that each wire is individually tensioned, it is only necessary to replace one wire, should a wire break. This represents a considerable saving of time and money over other types of surface, where at least a section of the mesh has to be replaced in the event of damage. All plant engineers will appreciate that reduction in down time is a vital factor in keeping operating costs low.

Due to its special construction, the piano-wire surface has a very much greater open section area than any other type of screen cloth, and thus it is possible to achieve outputs far in excess of those normally expected. In addition, the fact that smaller apertures can be used, means that improved gradings can be attained. It is now possible to work to a more rigid specification, and, at the same time, increase output considerably.

A Niagara Screen size 60 in. x 160 in. has handled as much as 140 ton per hr. of coal on a 1/2 in. wide aperture "Tenemax" surface. When handling singles on an opencast coal site a Niagara Screen size 4 ft. x 10 ft. equipped with approximately 1/2 in. wide aperture has handled an input of 15 tons per hr.

In the first instance "Tenemax" Piano-Wire Screening Surfaces were available in 1/2 in., 3/8 in., and 1/4 in. wide apertures only, but subsequent demand made it necessary for the range to be extended and the company has now made available 3/32 in. wide aperture and 1/8 in. wide aperture.

Metals and Minerals

Aluminium Poised for Further Gains

Aluminium companies in the U.S. were reported to be forming a solid front for the renewal after Thanksgiving Day (November 26) of contract negotiations with the United Steel workers. Negotiators for Kaiser have agreed to co-ordinate their strategy with Alcoa and Reynolds Metals, thus allaying the industry's fears that Kaiser Aluminium would follow the example of its sister company, Kaiser Steel, in negotiating an individual contract with the steelworkers.

Meanwhile, Kaiser has closed down another potline at its 176,000-ton reduction plant at Mead, Washington. This is the second potline to be closed down at Mead since the beginning of the month and trims the plant's production to 62½ per cent of capacity. The closure, which leaves five of the eight potlines in operation, is caused by stock build-ups.

Despite current uncertainties in the U.S., the outlook for the industry remains extremely bright. According to Kaiser, aluminium applications in motor cars will make another significant advance in the 1960 model year, showing an estimated increase of 13 per cent per car. This follows a ten-year trend in the industry of annual increases of 10-15 per cent in aluminium usage. A company-by-company survey by Kaiser showed that estimates set the net, or unfinished, weight of aluminium components at a per car average of 56.2 lb. for 1960 against an actual net usage of 49.6 lb. in 1959 models. These figures compare with 25 lb. five years ago and 12 lb. about a decade ago. Chevrolet's new compact car, with its aluminium engine, heads all U.S. models in aluminium usage this model year with 102.6 lb.

A tanker made completely from aluminium at a cost of about 1,200,000 marks was recently launched in Germany. The *Alumina*, as she is called, was built for the Frankfurt firm Vereinigte Deutsche Metall-Werke and is believed to be the first freight-carrying vessel ever built of aluminium. Only the engines are made of other metals. The vessel is 67 m. long.

Plans to build Mexico's first primary aluminium smelter, scheduled to yield its first metal in two years, have been announced by Intercontinental, S.A., a Mexican investment bank, and Alcoa. The plant will have capacity to produce 20,000 tonnes of aluminium a year. It will be located in the State of Veracruz, on a site which can be served by ocean-going barges. Nearly \$20,000,000 will be spent on the project, for which a new company called *Aluminio, S.A.* has been formed. Alcoa will have a 35 per cent interest in this undertaking, European investors will own 10 per cent, and the remaining 55 per cent will be held by Intercontinental and other Mexican investors.

CADMIUM PRICE INCREASED

The U.K. domestic price for Commonwealth and domestically produced cadmium has been raised from 9s. to

9s. 6d. per lb. delivered. The increase appears to be in the nature of a rather belated adjustment to the recently raised U.S. and Continental prices.

Whereas U.K. imports from all sources over the period January-September, 1959, amounting to 840.02 l.tons, already exceeded the total brought in for the whole of last year (823.83 tons), consumption has also improved considerably. Over January to September it reached 918.85 tons, and there seems every likelihood that the total 1959 offtake will comfortably exceed the 1,025.25 tons recorded for the whole of 1958.

SYNTHETIC DIAMONDS FOR METAL BONDED WHEELS

Further progress in the production of synthetic diamonds is indicated by the U.S. General Electric Co.'s announcement of a new man-made diamond for industrial purposes that could be used in metal-bonded wheels. At present G.E.'s synthetic diamonds are commercially available only for vitrified and resin bonded wheels. In making this announcement Mr. John D. Kennedy, general manager of the diamond product section of the company's metallurgical products department, said that the diamond was being evaluated in co-operation with makers of diamond products. It had not yet been put on sale.

SILICON PRICE REDUCED

Following the completion of extensions to the Merseyside plant, giving it an annual capacity of 4,000 lb. a year, Imperial Chemical Industries is reducing the price of silicon. This plant, which belongs to I.C.I.'s General Chemicals Division, is the first in the U.K. to produce on a commercial scale the grades of silicon required in the manufacture of semi-conductor devices such as transistors and diodes. Although output is now more than sufficient to meet U.K. demand and considerable quantities are exported, the capacity of the plant is to be more than doubled next year.

So far I.C.I. has been marketing lump or granular silicon, but work has been proceeding on the other form required by manufacturers of semi-conductor devices, namely zone-refined silicon in rod form. The company is now installing a plant which will produce polycrystalline rods early next year.

SUBSTANTIAL COLUMBITES RESERVES

"There seems little doubt", states the Mines Department, Federation of Nigeria, in its annual report for the year ended March 31, 1958, "that there will eventually be a market for columbite, but the recovery is slower than would be expected from publications. One feature inhibiting recovery appears to be uncertainty regarding availability of supplies. In this connection it can be stated that reserves of high-grade columbite in

Nigeria are substantial and probably sufficient to satisfy any market demand, pending the economic extraction of columbite compounds from suitable mineral deposits other than those containing columbite, and which are under active investigation in many parts of the world".

CHROMITE OUTLOOK BRIGHTENS

The outlook for the chrome ore market is now being viewed rather more hopefully. It is reported that some buyers, who in the past had been limiting their purchases to immediate needs, are beginning to show more interest in securing forward supplies. Steel production in many countries has been rising, and a healthier steel industry should mean a healthier chrome market. However, there is still a lack of any worthwhile demand for ore from the U.S., which is hardly surprising in view of the present situation in the steel industry, where work has been resumed for an 80-days cooling-off period under the Taft-Hartley Act.

Turkey is still reported to be a keen seller, while Turkish prices remain depressed. Turkish 58 per cent material, 3-1 ratio, was recently indicated at \$34-\$35 per ton c.i.f. The U.S. is normally a big buyer of Turkish ore.

U.K. imports of chrome ore from all sources during January-September this year totalled 128,413 l.tons compared with 144,646 tons during the corresponding period of last year.

A five-year contract for the sale of \$5,000,000 worth of chrome ore annually to Refractory Ore S.A., of Panama, has been signed by Consolidated Mines Inc., the principal refractory chromite producer in the Philippines. The ore will come from the Masinloc mines in Zambales, operated by Benguet Consolidated Inc.

RUSSIAN NICKEL DISCOVERY

According to Tass, a new deposit of nickel ores with a high nickel content has been discovered near the town of Serov, in the Urals.

WOLFRAM STILL HIGHER

The upward movement of wolfram prices still continues. At the time of writing wolfram ore shipment prices in London are indicated at 147s. 6d.-152s. 6d. per l.ton c.i.f. Europe. This compares with a range of 138s.-143s. reported in this column last week. Within a matter of a fortnight wolfram has thus recovered most of the ground lost since the end of September, when this year's peak of 165s. was reached. Sellers are still reported to be showing marked reserve in the face of a continuing demand.

The steep fluctuations of the past two months—remarkable even for wolfram—

are closely linked with the selling policy of the Board of Trade. The board's decision to start disposing of its stock appears to have been based purely on commercial considerations, the intention being to sell as much metal as possible without upsetting the market. Nevertheless its sales had an upsetting influence on the market, producing a sharp downswing in prices which continued until the Board decided to cut down its offerings. This reduction, coinciding with a revival in consumer demand, has contributed to the present recovery. It remains to be seen whether the price has now risen sufficiently to encourage the resumption of production at any of the numerous mines which suspended operations during the past two years.

CEYLON CUTS GRAPHITE DUTY

The Government of Ceylon has reduced the duty on graphite by Rs. 1.50 per cwt. The new duty is one rupee per cwt. This decision was taken after representations had been made by the Ceylon Chamber of Industry that the duty was prohibitive and was undermining the industry. The concession has met with a lukewarm reception from the Island's graphite interests, who are uncertain whether the assistance thus provided will prove adequate.

TITANIUM IN ORBIT

Titanium's entrance into the field of solid propelled missiles and the important weight-savings provided by this metal were the subject of a recent statement by Titanium Metals Corporation of America.

The use of titanium for the fourth-stage motor casing in the Juno II rocket that placed Pioneer IV in orbit around the sun, resulted in a weight-saving that enabled scientists to add two pounds to the payload. The total payload was 13.4 lb. Pioneer IV itself employed a high-strength titanium alloy—Ti-6Al-4V—manufactured by Titanium Metals Corporation, which was the strongest available at the time. It has a tensile strength of 160,000 p.s.i. when full heat-treated.

Titanium's ability to withstand the internal pressures generated by the burning propellant is regarded as being of critical importance by designers of solid-propelled military missiles such as the Pershing, Polaris and Minute man. The internal pressures, or burst pressures, of these military missiles are closely guarded secrets, but their force has frequently been likened to a minor explosion in that it exerts simultaneous pressures in three directions.

To meet these demands, a titanium alloy containing 13 per cent vanadium, 11 per cent chrome and 3 per cent aluminium has been developed, which provides a metal capable of withstanding more than 200,000 p.s.i. Like the alloy successfully used in Pioneer IV, it is weldable and can be heat treated.

The General Services Administration in Washington has announced that all recent bids to buy about 35,073 lb. of plus 170 Brinell hardness titanium sponge were rejected as unacceptable. The highest bid received was approximately 60 c. per lb. Since August 1 this year, Du Pont has been quoting A1 grade sponge at \$1.60-\$1.82 per lb. and A2 grade at \$1.50-\$1.70. New offers on a sealed bid basis will be accepted on December 11, 1959, to buy the sponge, which has been declared surplus to current Federal Government needs.

more available for sale and it appears that the price structure will be based on a producer price of 33 cents per lb.

TIN EASES AHEAD OF I.T.C. MEETING

The tin market has developed a weak undertone in face of the forthcoming International Tin Council Meeting due to be held next week and with stocks in official warehouses rising by 579 tons to a total of 7,710 tons. In spite of the settlement of the U.S. steel strike, an increased demand for tin has not been noticeable and with only routine enquiries from the U.K. and Europe, no support has been forthcoming to the market from consumer quarters. It is expected that at its meeting next week, the International Tin Council will grant a substantial increase in export quotas but opinion is equally divided on the question of whether they will be removed altogether or not. On Thursday the Eastern price was equivalent to £799½ per ton c.i.f. Europe.

LEAD/ZINC STATISTICAL POSITION STRONGER

The lead and zinc markets have seen little change although price levels have declined somewhat due more to lack of interest than to any other factor. Demand for both metals remains good throughout the world and stocks available for sale have declined and are declining rapidly.

This situation is giving rise to a number of comments on the present set-up in world trading in the two metals. The two most important appear to be, firstly, the comments made by the Australian and Canadian delegates at the recently concluded G.A.T.T. Conference in which they warned the U.S. that unless quota restrictions were removed some retaliatory measures might have to be brought into force, and, secondly, six U.S. companies, representing the majority of the domestic lead and zinc smelting capacity in the U.S., are urging that the quotas be rescinded and their place taken by increased tariffs.

These two statements seem to indicate that any meeting under U.N. auspices to consider trading in lead and zinc would meet with serious difficulties as, if quotas were relaxed, tariffs increased and at the same time world production freed, then this would be a signal for a very serious downswing in sterling lead and zinc prices. It appears that whatever action the U.S. takes, restrictions on the sale of lead and zinc will have to continue although, perhaps, in a somewhat modified form.

Closing prices are as follows :

	Nov. 19		Nov. 26	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£245	£245½	£237½	£238
Three months ..	£236	£236½	£234	£234½
Settlement ..		£245½		£238
Week's turnover	13,275 tons		11,725 tons	
LEAD				
Current ½ month ..	£72½	£72½	£70½	£70½
Three months ..	£72½	£72½	£71½	£71½
Week's turnover	6,755 tons		8,975 tons	
TIN				
Cash ..	£797	£797½	£794½	£795
Three months ..	£796½	£797½	£793½	£794
Settlement ..		£797½		£795
Week's turnover	685 tons		890 tons	
ZINC				
Current ½ month ..	£94½	£95	£94½	£94½
Three months ..	£89½	£90	£89½	£89½
Week's turnover	6,100 tons		4,750 tons	

London Metal and Ore Prices appear on inside back cover.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The firmer undertone noted in the last report was short-lived except in the case of the copper market and at the time of writing an atmosphere of uncertainty hangs over all markets. At the same time it appears that in the case of copper, lead and zinc, the immediate prospects from the point of view of price, are more favourable for the near-term than for the more distant future.

COPPER STRIKE SETTLEMENT NO NEARER

In London, the main feature of the copper market has been the decrease in the backwardation which has been brought about by offerings of spot being on a relatively larger scale than recently and by the fact that most operators had taken steps some time ago to square their late November positions: it is expected, however, that in spite of official stocks showing a further slight increase of 44 tons, the backwardation is likely to increase as the total stocks only amount to 6,852 tons.

Most operators are still waiting for the outcome of the strike in the U.S. which continues to present a very confused picture. At the time of writing it appears that, apart from an agreement between Kennecott and the steelworkers union and

between Phelps Dodge and a group of craft unions, no other settlements are in sight and, in fact, the only negotiations proceeding appear to be between Kennecott and the Mine Mill union, which are being carried on without any sense of urgency.

Some observers feel that a settlement of the strike is still far off as the main difficulty concerning codes of work practice did not figure largely in either of the two settlements already reached. It is also pointed out that the steel union settlement with Kennecott will not enable any copper to be produced as the Mine Mill union appear to be picketing the plants.

The copper market itself in the U.S. has shown a tendency to decline with wirebars for December arrival being quoted at about 37½ cents and the scrap intake price being reduced to 25½ cents per lb., which is equivalent to only 30½ cents per lb. for refined copper for delivery in three months' time. In sympathy with the lower prices in London and the U.S., the Belgian quotation was lowered sharply from the equivalent of approximately 31½ cents to the equivalent of approximately 30.15 cents New York or Antwerp.

There is speculation as to the likely price which will be quoted by both producers and Customs Smelters when copper is once

Mining Finance

Bancroft Now Going Well

Bancroft stockholders will be more than satisfied with one of Mr. Harry Oppenheimer's remarks in his review of 1958/9 operations. "Stockholders," he says, "will not have to wait long before the company enters the ranks of the dividend payers." This has come as something of a surprise to the market, in view of the fact that Bancroft is still carrying forward a loss of some £2,800,000, but, as Mr. Oppenheimer explains, this loss was taken into account when permanent capital was raised earlier this year.

Also important in a dividend context is the fact that Bancroft ranks as a "new mine" for taxation purposes. Under Rhodesian fiscal law, this means that redeemable capital expenditure is allowable in equal instalments over the first five years of production, and thereafter in the year in which it is incurred. If it is the intention to pay dividends in the very near future, therefore, they will be paid from untaxed income, with the result that their actual value to the shareholder will be less than would be the case if taxation could be recouped under D.T.R. Nevertheless, the fact that Bancroft is in a position to consider dividends at all is heartening news for those stockholders who have seen the mine through its black days.

It is still too early to be sure that Bancroft's luck has really changed. As Mr.

Oppenheimer says, "there are still risks at this stage of Bancroft's life which should not be underestimated." On the other hand, the mine is now running smoothly and production has reached the target rate of 50,000 tons per month, while 1958-9 resulted in a small profit in spite of the fact that only a very small amount of copper had actually reached buyers by the end of the financial year.

On the development side, too, the Bancroft picture looks healthier than ever before. Operations are being concentrated on the South Kirila Bomwe orebody where the grade is highest, but a haulage and ventilation shaft are now under way to serve the Kirila Bomwe North orebody. Total Kirila Bomwe reserves now total 73,000,000 tons, while a further 30,000,000 tons are contained in the Konkola orebody on which no operations other than pumping are currently taking place.

THE R.S.T. GROUP

It has been noticeable that the R.S.T. group has shown an increasing tendency to develop a "group identity" recently. A striking example of this was the amalgamation last year of the individual mine magazines into "Horizon" an admirably produced monthly presenting the activities

of all the R.S.T. both to their employees and, on request, to shareholders.

This year the process has been taken a stage further by the publication of a chairman's statement covering the activities of the group as a whole (see page 548). This is welcome, because although there is no shareholding link between, say, R.S.T. and Roan Antelope apart from the American-Metal Climax holding in each, much of Sir Ronald Prain's commentary is common ground to all the companies.

Sir Ronald's comments on the political situation and on the outlook for copper are referred to elsewhere in this issue. Suffice it to say here that on both scores he is optimistic. The company's results for the year, too, need no further reference, because the admirable quarterly reports published by the group keep shareholders fully up to date. The results of the operating companies on the Copperbelt are summarized in the table opposite.

COPPER QUARTERLIES

After the excitements of recent quarters, the quarterly reports of Roan Antelope, Mufulira and Chibuluma are more notable for a return to normality than for surprises. Sales are up, as was to be expected in view of the American strike, while receipts per ton are no more than marginally changed. Costs generally have risen. Estimated profits before providing for taxation but after providing for replacements, etc., and the corresponding figures for the previous quarter are as follows: Roan £1,271,000 (£1,593,000); Mufulira £1,856,000 (£1,829,000); Chibuluma £357,000 (£483,000).

CASTS DID PAY MORE

The doubts which assailed this column last week on the correct treatment of Casts' special interim has been resolved by the Company's chairman, Mr. A. Chester Beatty, in his annual statement to shareholders which appears on p. 554. The 1s. declared in December last year is to be regarded as a special bonus, so that the correct comparison is between dividends of 2s. 6d. for 1957-8 and 3s. 3d. for 1958-9.

The big news for shareholders interested in Casts, however, is that because of the age of some of the treatment plants, the company is considering proposals to replace them by one modern centralized plant. The capital expenditure involved would be of the order of £1,000,000 and, unusually for Mr. Chester Beatty, no indication is given as to the possible effect of this on dividends. Certainly the balance sheet appears to be strong enough to absorb this spending without undue hardship, but policy might dictate restraint until the plant has been proved.

An interesting experiment is being undertaken by Casts with regard to the people living within its lease area. Unlike other Sierra Leonians, these people are unable to mine diamonds on their own account, and, not surprisingly, illicit mining appears attractive to them. In an attempt to overcome this aspect of the security problem, Casts have re-examined their mining programme with a view to finding sites suitable for hand-washing. Such sites have been located in most of the Kono chiefdoms, and a system of contract mining has been brought into existence. A contractor is selected, trained, and given a site to work under Cast supervision, and the diamonds produced are bought by Casts. The scheme is still young, but, says Mr. Chester Beatty, the first two sites opened in Kono have so

LONDON MARKET HIGHLIGHTS

A certain amount of publicity given last week to the growing U.S. interest in South African gold shares has brightened Kaffirs considerably. There was no runaway boom, but the daily number of bargains marked crept over the 900 mark for the first time since February and recent steady London selling appeared to be on the wane.

Johannesburg continued to take stock whenever it was offered and there was firm evidence of buying by U.S. sources. Shares of the newer mines suddenly came to the fore. Free State Geduld led the way with a rise of 10s. to 190s. 7½d. while not far behind were Western Holdings (163s. 1½d.) and St. Helena (85s.).

Doornfontein (35s. 9d.) appeared to have recovered from the recent setback which had followed the chairman's cautious reference to the dividend outlook. West Driefontein's impressive earnings were thought to be intriguing U.S. investors and the shares rose to 192s. 6d.

Shares of the older dividend-payers also came in for attention, but in many cases there was little stock available. For this reason Durban Deep climbed to 40s. and Grootvlei reached a four-year peak of 24s. 3d.

In the diamond group, De Beers at first fell further following the news of the company's venture into the synthetic diamonds, but later picked up to 186s. 3d. following Continental and Cape demand. After easing to 23s. 6d. following news of the £1,000,000 spending for up-to-date plant, "Casts" later rallied to 24s. 6d.

The copper section was naturally enough

still influenced by the daily fluctuations of a highly sensitive metal price. But the market was cheered by the Rhodesian Selection Trust group's September quarterly reports and more especially by Sir Ronald Prain's optimism about long-term prospects.

Bancroft bounced back into popularity, jumping 2s. 9d. to 28s. This was immediately in front of the annual report which told of plans to make a start on dividend payments much sooner than had been thought likely. Messina became "ex" the final dividend and seemed to be unwanted at around 126s. 3d. At this price the shares yield as much as 7.1 per cent, a very reasonable return for a copper share of this calibre. The company's young offshoot, M.T.D. (Mangula), however, remained a buoyant market at around 11s. 10½d.

A certain amount of profit-taking made several tin shares look particularly attractive at the lower prices. Tronoh, for example eased to 28s. 6d. and showed a yield of fully 7.5 per cent with the certainty that current year's working will produce a higher dividend total. Hopes of an increased interim from Ampat were fully justified with a declaration of 15 per cent against 10 per cent and the shares rose to 14s. 3d. They still gave a yield of 8.4 per cent on the old dividend total.

Elsewhere, lead-zincs which had been previously a rather depressed section staged a rally. Sentiment was helped by the much better preliminary results from Lake George (4s. 7½d.). Mount Isa, always ready to go ahead, promptly jumped 1s. 6d. to 54s. and Consolidated Zinc improved to 69s. 6d. ex-dividend.

far proved most successful. If enough sites can be found for all those wanting them, the effect on the security problem could be substantial.

BUFFEL'S HOUSING PROBLEM

The excellent native labour position this year on the South African gold mines has received frequent attention in these columns. In the 1958-9 report of Buffelsfontein, however, it is shown that the sudden availability of labour has not been without its problems.

Still a young mine, Buffels has by no means completed its surface construction programme, and native labour has so far been housed in only one of the two compounds planned. The other has remained on the drawingboard with the intention of deferring it until sinking of the Eastern Twin Shafts begins in 1962. The sudden influx of labour, however, has necessitated the construction of this compound, and this, in turn, has meant the provision of roads, railways, electric power, water and sewerage much earlier than had been planned. The net result is that capital expenditure next year will be of the order of £2,800,000, compared with £1,575,167 in the year just ended.

Other news from the Buffels report is that work has commenced on the extension of the gold plant to a nominal capacity of 200,000 tons per month. It is expected that the additional capacity will be available some time in the last quarter of next year.

NEWS FROM UNION MINIERE

An informative interim report from the Union Minière du Haut Katanga states that operations so far this year have not been affected by the recent Congo unrest. Copper output this year should reach a new record level of 270,000 tonnes, compared with last year's restricted output of 235,500 tonnes and a previous record of 247,500 tonnes set in 1957.

New construction work is proceeding according to plan, including such projects as the new Luilu plant, the Kambove West concentrator, shaft-sinking at Kamoto and an improved hoisting installation at the Kolwezi mine. Research on concentration processes is also being pushed ahead.

The Luilu project will develop into an important automated plant for the leaching of electrolytic copper and cobalt ore. It is likely that the first stage will be completed towards the middle of next year, rather earlier than planned. This stage corresponds to a yearly capacity of 50,000 tonnes of copper and 1,750 tonnes of cobalt. Although Lumbumbashi and Shituru plants are gradually to be shut down, the expansion of Luilu will mean that overall copper production will be progressively increased.

MOUNT LYELL'S YEAR

The annual report of the Mount Lyell Co., gives some interesting details of prospecting during the year. While drilling on the company's leases was somewhat disappointing, in that pyrite mineralization was proved where copper ore had been expected, downward extension of the West Lyell orebodies was also proved. These continuations are of the orebodies referred to last year by the chairman as containing 50,000,000 tons of ore with an average grade of 1 per cent copper. This tonnage remains excluded from reserves while a suitable mining method is being considered.

Prospects of finding more rich underground ore are considered good. The higher grade deposit in the Corridor area is to be explored by tunnelling from the Crown Lyell Mine, and the Crown Lyell Shaft has been recommissioned and the North Lyell tunnel re-opened.

In association with Electrolytic Zinc Co. of Australasia, Mount Lyell continued geological and geophysical survey work in the rugged and inaccessible south-west corner of Tasmania. An area in the mountains, known as the Moore Valley has been delineated and is an interesting and definite geophysical anomaly. This is the best prospect so far found in the course of the explorations, and will be drilled. A possible route is being surveyed to the area and a road will be made for transport of machinery and supplies to the locality.

Production by the Mount Lyell Mine during the year was 1,939,173 tons of ore assaying 0.652 per cent copper, and 1,961,138 tons of waste. Copper produced was 10,102 tons, the recovery being 82.35 per cent. Copper production target in the current year is 11,000 tons. In future operations, larger tonnages of waste must be removed than in the past, to make sufficient ore available, and the erratic shape and grade of the West Lyell orebodies has made the calculation of necessary overburden removal a complex matter. Ore reserves are 38,233,000 tons with a grade of 0.71 per cent copper: 0.067 oz. silver, 0.008 oz. gold.

PROGRESS AT GREAT BOULDER

Great Boulder Gold Mines has completed the electrification of the winder at Edwards shaft at a cost of £A105,000, and a new power unit to take the increased load has been installed at a cost of £A55,000. The company is sinking a 1,000 ft. internal shaft from the 2,950 ft. level to reach an expected depth of 4,000 ft. Hamilton shaft is to be similarly electrified, the depth of this shaft rising 3,250 ft.

A main haulage way connects Hamilton and Edwards shafts at the 3,100 ft. level. Ore mined below this horizon will be hoisted through the internal shaft and transported along this level, to be hoisted to surface through Edwards shaft. The electric winder at Edwards shaft is powered by a 1,000 h.p. motor, and has the latest safety devices, while the new electric winder for Hamilton shaft will leave the U.K. in November. Underground development continues very satisfactorily and reserves stand at 2,009,000 tons with a grade of 5.55 dwt.

Financial News and Results

Another Reprieve for Freddie's.—The National Finance Corporation of South Africa has agreed to extend until the period December, 1960, to April, 1961, the due dates for repayment of £600,000 of the £800,000 outstanding on its loan to Freddie's Consolidated. The remaining £200,000 will be repaid next month.

Another Repayment from Clutha River.—Subject to shareholders' approval at an E.G.M. on December 9, Clutha River is to make a further capital return of 3d. per share. This will reduce the par value of the shares to 1s. 5d. In order to retain the benefits of capital duty already paid, the authorized capital will thereafter be restored to the original level of £224,995.

Gopeng/Kinta Merger.—At an extraordinary meeting of Gopeng Consolidated held on November 20, resolutions were passed approving the scheme for a merger with Kinta Tin. The offer to Kinta shareholders has been accepted by more than 92 per cent, and is now unconditional. As a result, Gopeng can now acquire the remaining Kinta capital compulsorily.

Chibougamau Mining Plans.—During the current year, Chibougamau Mining and Smelting will devote major attention to the exploration of its 61,000 acres of selected land-holdings. Net expenditure during 1958-9 totalled \$295,884.

(Continued on page 553)

OVERSEAS REPRESENTATIVE. One of the leading firms of underground machinery manufacturers requires a young engineer as overseas representative. Experience of underground mechanization essential and fluency in at least one foreign language desirable. This position, which would entail extensive travel abroad, offers an interesting and varied life and the opportunity of advancement within an expanding and progressive Company. Reply with details of age, experience and salary required to Box No. 649, *The Mining Journal Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

OPERATING RESULTS OF COPPERBELT COMPANIES

Company	Year to June 30	Copper Sales	Depreciation	Taxation	Net Profit after Tax	Transfers to Reserve	Net Divs. per ord. share
		(£000)	(£000)	(£000)	(£000)	(£000)	s. d.
R.S.T.							
R. Antelope	1958	13,682	650	870	1,452	675	3½
	1959	17,698	1,100	1,910	2,949	1,350	6½
Mufulira	1958	16,716	750	1,430	2,720	1,250	2 0½
	1959	19,995	1,200	2,410	3,964	1,300	3 5½
Chibuluma	1958	4,813	200	—	1,151	1,150	—
	1959	4,138	200	—	1,145	1,150	—
Rhoanglo							
Nchanga	1958*	23,605	1,195	2,475	4,370	1,000	10 0
	1959*	24,906	1,290	3,130	4,705	729	12 6
Rhokana	1958	18,187	488	1,100	4,259	1,406	25 0
	1959	17,943	526	2,090	5,625	508	40 0
Bancroft	1958	3,673	—	—	L1,682	—	—
	1959	2,389	—	—	106	—	—

* Year to March 31.

L Loss.

RHODESIAN SELECTION TRUST GROUP OF COMPANIES

Companies in the Group are incorporated in either Northern or Southern Rhodesia.

The following is an abridgment of the Statement dated October 15, 1959, by the Chairman, Sir Ronald L. Prain, O.B.E., which has been circulated to members.

COPPER

Our main business is the production and sale of copper. During the past year the combined production of the mines in the group was 188,224 tons, representing 6.5 per cent of the free world's production of primary copper. The following table shows the detail of this production:

Copper Production 1958/59

	long tons
Mufulira	88,056
Roan Antelope	80,932
Chibuluma	19,236
Total	188,224

The published ore reserves of the group are shown in the following table:

Ore Reserves

	short tons	Grade per cent total copper	Grade per cent cobalt
Mufulira	177,093,000	3.31	—
Roan Antelope	95,560,000	3.05	—
Chibuluma	7,984,000*	5.04	0.22
Baluba (undeveloped)	112,000,000	2.41	0.16
Chambishi (undeveloped)	35,000,000	3.37	—
Total	427,637,000		

* Does not include an ore occurrence, estimated at 2,000,000 tons (4.74 per cent total copper; 0.05 per cent cobalt), 8,000 feet west of the mine, indicated by drilling 1957/59.

With this predominant interest in copper, we cannot be isolated from the main events that occur in the world copper industry. The present situation is basically one where the recent rapid advance in mine output has temporarily exceeded the growth in demand, but it would be a miracle if mine output in this industry, which has to be planned years in advance, should at any one time exactly balance the world demand which is subject to so many influences which cannot be foreseen. However, the general trend of copper consumption must, in my opinion, be upwards if short-term variations in demand are disregarded. This trend is based on an affinity between world population, coupled with improved standards of living, and the uses which are traditional to copper. Provided that the industry is prepared to ensure that the price of copper is kept within bounds which will not encourage substitution, there seems to me to be no reason why copper consumption should not maintain and increase its characteristic growth factor. I have not in any way altered the opinion which I have expressed over the years, namely that copper has prospects which few other commodities can equal in promise. The present oversupply is a temporary situation and at reasonable prices the consumption growth of the future should be such that in the next decade it will test the ability of the mining industry to provide enough copper to meet this expansion. I am not apprehensive as to the industry's ability to do so.

Production Policy

One further factor comes into the picture, namely the willingness of the copper industry to adjust its production

rate at times of low consumption in order to avoid exaggerated swings in price. In the last two years the industry has demonstrated its willingness to adopt such a production policy and this would appear to indicate a greater realization not only of the industry's self-interest, but of its responsibility to the consuming industry of the world to maintain a price range which is not excessive, thus eliminating such violent movements as characterized the industry some years ago with the consequential distortion of the true balance between supply and consumption.

The price of copper quoted by the London Metal Exchange during the year varied within an upper limit of £260 and a lower limit of £191 15s. per ton, which in a normal year would be an excessive range but which is not surprising considering the strikes which occurred in Rhodesia, Canada and the United States and the very strong buying movement which characterized the first half of 1959 and which was based on fears of a strike in the American mines after the end of June. This strike eventually began in August, effectively shutting down most of the United States copper industry; and, at the time of writing, this strike is still in progress. The situation has also been aggravated by a strike in Chile which began earlier this month. Owing to the stocking-up which had occurred in the first half of the year, these strikes have not yet had any drastic effect on prices but if they are prolonged there will doubtless be a sharp temporary increase. Much will thus depend on the length of these strikes and on the strength of general business activity in the United States and Europe during the last quarter of 1959.

The possibility of improving the traditional international marketing methods is a question which continues to exercise the minds of many producers, and of most of the industry associations of Europe.

Just over 70 per cent of the copper which we produced last year was sold in the United Kingdom and the balance was sold to 50 customers in 18 countries.

INDUSTRIAL RELATIONS

The main event of the year was the strike by the European union, which lasted from September 12 to November 4, 1958, the longest strike in the history of the Copperbelt. An important result of this strike was the request by the companies and the union to Government to engage the services of an industrial relations expert to examine the negotiating machinery which had been in force for so long on the Copperbelt. As a result of this Sir Frederick Leggett, K.B.E., C.B., spent some weeks on the Copperbelt and evolved certain proposals for changes in this negotiating machinery. His proposals were accepted by the companies and the union, and led to the setting up of a Mining Joint Industrial Council which has operated successfully since then. The new proposals also provide for many questions to be discussed at a lower organizational level than hitherto and for a slower tempo of negotiation which we think is an advantage under Copperbelt conditions.

MISCELLANEOUS

I mentioned last year that the copper companies would be submitting evidence

to a commission of inquiry which was to be set up to examine the whole rating structure of the Rhodesia Railways. The commission sat towards the end of last year and published a report in May. It is not yet known whether the commission's recommendations are acceptable to the Federal Government, or, if acceptable, when they are likely to be implemented. Just before the commission's report was published the Rhodesia Railways introduced what they described as a "temporary surcharge" on all goods rates, including copper, and this virtually cancelled out the small reduction of 25s. per short ton in May, 1958.

ROAN ANTELOPE COPPER MINES LIMITED

Production in terms of ore was 5.5 million tons compared with 5.7 million tons the previous year, due principally to the effect of the strike early in the financial year.

The grade of ore milled increased to 1.97 per cent copper as compared with 1.87 per cent for the previous year.

Production for the year was planned on the basis of a curtailed programme as our contribution towards the correction of the imbalance in the overall world supply/demand position and our production target was 80,000 long tons of copper. Despite the strike, production amounted to 80,932 long tons, due to the mining of higher grade ore and to the treatment of holding furnace slag which had accumulated over past years.

The average cost of production increased from £138 to £154 per ton. This increase was due to higher mineral royalties and increased bonus scheme payments resulting from the higher copper price and to the inclusion for the first time of the cost of refining a proportion of the production in Rhodesia.

Financial Results

Sales for the year amounted to 80,617 long tons which, apart from metallurgical and weighing differences, exactly matched the production.

The average price at which our copper was sold was £220 per ton, an increase of £43 per ton compared with the previous year. The profit margin per ton of copper increased from £39 to £68 for the year under review, and on this basis the gross profits amounted to £5,505,000. To this has to be added the increase in the value of copper stocks amounting to £56,000. Although the stocks remained unchanged in volume, the valuation increased because our stocks are valued at current cost. Interest earned, less interest paid, and miscellaneous minor items brought this profit to £5,959,000, which is almost exactly double the corresponding figure for the previous year.

In the figure of interest earned there is included provision for a forthcoming maiden dividend from Ndola Copper Refineries Limited.

Tax liability on this profit amounts to £1,910,000. The appropriation for replacements this year is £1,100,000, which is a considerable advance on the appropriation for the previous year, and slightly in excess of the provisional figure set by the board a year ago. Last year's appropriation was cut heavily on account of the lean profits of that year, and this year's appropriation is much more in line with the average amount which it is necessary to reserve under this heading over the years. Replacements reserve at

the end of June, after making this appropriation, amounted to £2,049,000, which is sufficient to cover all sums authorized by the board up to and including June 30, 1960.

The appropriation to general reserve this year has been put at £1,300,000. This, too, is about double the corresponding appropriation of a year ago which was kept to the minimum. This year's appropriation is arrived at after taking into account certain capital payments in respect of participation in prospecting companies, a further contribution towards the capital cost of Ndola Copper Refineries and the sums which we are committed to lend to the Federal Government in respect of development finance.

The balance available for dividend is £1,708,000. An interim of 3d. per share less taxes, was paid last July. The board's recommendation for the final dividend is 7d. per share, less taxes. The total dividend for the year is thus 10d. per share, which is exactly double that of the previous year, which I trust shareholders will find not unsatisfactory.

Mine Position

After the end of the strike the former policy of hoisting ore of lower grade than normal while operating under production restriction was abandoned in order to offset the effect of the interruption. Normal mining sequences were reverted to with a consequent increase in grade of ore hoisted during the second half of the year.

NDOLA COPPER REFINERIES LIMITED

In August of last year this plant commenced operations. These were almost immediately shut down as a result of the Copperbelt strike. Operations were resumed in November, 1958, and continued uninterrupted throughout the rest of the year. This erratic start, however, affected the efficiencies and rate of production so that during the financial year it was only possible to produce 31,990 tons of electrolytic copper. These operations resulted in a gross profit of £240,000. With miscellaneous adjustments this profit was raised to £264,000. Depreciation is set by the board at £48,000; transfer to general reserve is set at £100,000; and a dividend of 3½ per cent gross, less Rhodesian taxes at 7s. 6d. in the £, will cost £103,000, thus leaving a carry forward of £13,000.

This is the refinery's maiden dividend and two-thirds of it will go to Roan Antelope Copper Mines, the remaining one-third going to the other shareholder, British Insulated Callender's Cables Limited.

In a normal year it is expected that the dividend should be 10 per cent gross, less taxes. Owing to an over-expenditure on capital account and to cover working capital, it will be necessary to engage in some temporary borrowing of up to £600,000 from the banks which will be repaid over a short period out of refinery profits. Until this operation is completed the dividend will have to be less than the full 10 per cent originally envisaged.

The second stage of the refinery is expected to be ready for operation early in 1960. Owing to current favourable conditions for the disposal of fire refining grade copper, this extension may not be used in the immediate future. However, arrangements are expected to be made for copper from other companies to be refined there not later than 1962.

MUFULIRA COPPER MINES LIMITED

Production of ore during the year totalled 4.1 million tons as compared with 4.4 million tons during the previous year. The reduction is due primarily to the effects of the curtailment programme and the strike. It was not possible, without prejudicing normal good mining practices, to overtake the loss of production caused by the strike. In fact, production amounted to 88,056 long tons of copper as compared with 93,000 tons planned before the strike. The average grade of ore hoisted for the year was 2.65 per cent total copper compared with 2.67 per cent for the previous year.

The average cost of production increased from £136 per ton to £149 per ton. This increase was due mainly to higher mineral royalties and increased bonus scheme payments due to the higher copper price. Mining costs were £2.9 per ton greater than those for the previous year, mainly because of special development work in the western section of the mine. Other departmental costs showed an improvement of £2.2 per ton.

Financial Results

Sales for the year amounted to 87,521 tons which, apart from metallurgical and weighing differences, exactly matched the production.

The average price at which our copper was sold was £228 per ton, an increase of £40 per ton compared with the previous year. The profit margin per ton of copper increased from £52 to £80 for the year under review, and the gross profits amounted to £7,022,000. To this has to be added the increase in the valuation of copper stocks amounting to £295,000. Although the stocks were unchanged the increase in the valuation came about as a result of our policy of valuing copper stocks at current cost of production. Interest earned, less interest paid, and minor adjustments brought this gross profit to £7,574,000 compared with £4,900,000 in the previous year, equivalent to an increase of 55 per cent. Tax liability on this profit amounts to £2,410,000.

The appropriation to replacements reserve this year is £1,200,000 which compares with £750,000 in the previous year. The latter year was one of lean profits, and the board had little option but to reduce the appropriation to what the profits would stand, but shareholders will recollect that I gave a warning last year that over a period of years the appropriations would have to be at a higher rate. This year's appropriation is more in line with the expected average. The replacements reserve at the end of June stands at £1,811,000 which is sufficient to cover all expenditure authorized by the board until June 30, 1960.

The appropriation to general reserve is £1,300,000, compared with £1,250,000 in the previous year. This provision covers mainly certain capital payments in respect of participation in prospecting companies and the sums which we are committed to lend to the Federal Government in respect of development finance.

The balance available for dividend is £2,751,000. An interim of 1s. 9d. per share, less taxes, was paid last July. The board has now recommended a final of 3s. 9d. gross per share, less taxes. If this recommendation is accepted the total for the year will amount to 5s. 6d. gross per share, less taxes, an increase of 69 per cent over the previous year.

CHIBULUMA MINES LIMITED

Despite the strike, production in terms of ore was 513,000 tons compared with 485,000 tons the previous year. The grade fell slightly from 4.70 per cent total copper in the previous year to 4.67 per cent in 1958-59.

Copper production for the year from mine production amounted to 19,236 long tons. This compares with a total output for the previous year of 27,177 long tons, of which over 9,000 long tons came from a stock-pile of concentrate accumulated in previous years. The costs for the past year averaged £144 per ton for all forms of copper.

The cobalt refinery at Ndola operated throughout the year except during the strike period, and continued to experience certain operating difficulties. In spite of this the cobalt matte production for the year was 7,741 short tons compared with 6,645 short tons during the previous year. Costs, including freights, overseas costs, refining charges and mineral royalties, and after crediting revenue from the sale of 1,025 long tons of copper recovered as a by-product, averaged 13s. 3d. per lb. of cobalt metal on a delivered U.S.A. basis.

Sales

Copper sales for the year totalled 19,073 long tons at an average price of £217 per ton. This represents a reduction in tonnage compared with last year, but an increase in price of £40 per ton.

As far as cobalt is concerned we are utilizing our production at present to meet our obligation to the United States Government in respect of interest and loan capital repayments. In this way we delivered 830 short tons of cobalt metal at an average price of £1,425 per ton, giving a value of £1,183,000.

Financial Results

The gross trading profit was £1,488,000. Deducting loan interest, and adding interest earned by us on our cash balances, the net profit came to £1,345,000 compared with £1,352,000 last year.

There is no tax payable on this profit, on account of the federal tax laws which applies to new mines.

The terms of our agreement with the United States Government oblige us to repay in each year metal to a value equivalent to 75 per cent of the previous year's net profits after adding back interest payable. During the past year, we delivered cobalt metal to a value of £1,183,000, which was allocated against accrued interest, and redemption of loan capital. The loan was thus reduced at June 30, 1959, to a sum of £2,917,541. During the current year our obligation will amount to £1,130,000 worth of metal and we expect the loan outstanding at the end of June, 1960, to have been reduced to approximately £1,900,000.

The board this year has appropriated the sum of £200,000 from profits to replacements reserve. Of the balance of profit for the year, £1,150,000 has been transferred to general reserve to cater for two obligations, namely, the repayment of loan capital and sundry expenditure of a capital nature.

Technical Plans

The main technical development concerns the so-called Chibuluma West scheme. During the year we announced that as a result of the discovery of ore

some 8,000 feet to the west of the existing mine, we had decided to sink shafts, with a view to mining approximately 10,000 tons of ore a month at Chibuluma West, all of which would be treated through the existing mill. The capacity of the latter has during the past year been proved to be in excess of 50,000 tons per month as compared with the original estimates of about 40,000 tons per month.

The Chibuluma West development is expected to take four years to bring to completion, and to add 4,000 long tons of copper to the regular annual production of Chibuluma. In terms of current world experience the capital cost of this development per ton of capacity is low and in addition it is expected that the development will help to reduce Chibuluma's production costs per ton.

RHODESIAN SELECTION TRUST LIMITED

The total revenue for the year, which is represented almost entirely by dividends received or receivable from Mufulira Copper Mines amounted to £1,746,000. Administration and sundry expenses reduced this figure to £1,631,000 compared with £915,000 for the previous year. There are no taxes payable on this income.

The commitments of the company include participation in, and expenditure on, Chambishi Mines, Baluba Mines, Rhodesian Selection Trust Exploration and certain other prospecting and exploration companies. The board has appropriated the sum of £150,000 to general reserve to take care of these commitments, leaving the free cash resources of the company approximately unchanged.

This leaves a sum of £1,566,000 available for dividend, after bringing in the balances brought forward from the previous year and certain tax adjustments from past years. An interim of 4d. per share, less Rhodesian taxes at 7s. 6d. in the £ was paid last July. The board has now recommended the payment of a final dividend of 9d. gross per share, making a total for the year of 1s. 1d. gross, costing £1,531,000, thus resulting in £35,000 being carried forward. This total dividend compares with 7d. for the previous year.

During the year an agreement was signed between Rhodesian Selection Trust Exploration Limited and the Bamangwato Tribal Authority of Bechuanaland, whereby a prospecting concession over almost the entire area of 44,000 square miles of the Bamangwato territory is envisaged. The agreement, which was concluded with the approval of Her Majesty's Government in the United Kingdom, provides for Rhodesian Selection Trust Exploration Limited, after a preliminary period of investigation, to form a company to be controlled by it which will have the right to prospect and explore over the area for a period of up to 10 years. In the event of mineral discoveries of economic significance mining rights will be exercisable by such company or by mining companies formed by it.

The preliminary reconnaissance work referred to above has just been completed and it is expected that a concession will be granted some time during November. Our partners in this prospecting work will be Mond Exploration Limited, a Canadian company and Minerals Separation Limited, a United Kingdom company.

BALUBA AND CHAMBISHI

The future of the undeveloped Baluba orebody also continues to engage the attention of the directors. You will notice from the ore reserve figures quoted earlier in this statement that the reserves have again been increased. The possibilities of opening up this orebody are being examined and include the possibility of integrating the operation with that of the neighbouring property of Roan Antelope.

The directors' report of the Chambishi company indicates that the question of the development of that orebody continues to be examined. The two main examinations are concerned with the possibility of starting development as an open-pit operation and the question of the metallurgy involved in the treatment of oxidized ores in the upper levels.

Prospecting in Southern Rhodesia is undertaken by Rhodesian Selection Trust Exploration Limited. This company has concentrated its main endeavours during the past year on copper exploration in the Lomagundi area. The results based on soil chemistry and pitting and some drilling are interesting and encouraging, but it is too early to say more than this.

CONCLUSION

In looking forward, it seems to me that the future prosperity of your companies, which are well endowed with ore reserves, with excellent plant and equipment, and with a first-class organization, will depend on three major factors.

The first, and without doubt the most important, is the satisfactory evolution of the political future of the territories in which we operate. The second is the behaviour of the copper market in the years to come, and the ability of the industry to evolve production and marketing policies which will ensure that there is neither too much over-production with its consequential distressing effect on price, nor any excessive shortage with its equally distressing effect on prices and resultant loss of markets. The responsibility increasingly shown by the industry in this respect holds promise for the future.

The third factor is the ability of our mines to maintain costs at a viable level. Our geographical situation, and other factors over which we have no control, result in only about two-thirds of our costs being incurred on our mines and thus capable of being affected by the efficient plant or the good organization to which I have referred. It is still sometimes believed that our mines are among the cheapest producers in the world. It is many years since this statement was true, and I have never hesitated to advise shareholders accordingly. The only assurance I can give is that we shall continue to regard our responsibility in respect of this factor as among our foremost.

Of one thing I am certain, that the copper mines of central Africa are an indispensable part of the structure of modern civilization and will be required to play an increasingly important part in the world's industrial developments for the foreseeable future. The energies of your directors will continue to be addressed to ensuring, as far as lies in their power, that these companies will play their full part in the development of central Africa and in the world copper industry.

The Chairman also commented briefly on the present and prospective political and economic situation in the Federation.

CORONATION SYNDICATE LIMITED

(Incorporated in the Union of South Africa)

CHAIRMAN'S STATEMENT

The Fifty-fourth Annual General Meeting of Coronation Syndicate Ltd. will be held in Johannesburg on December 17, 1959.

The following is an extract from the circulated review of the Chairman, Mr. S. F. Dench:

Your Company's subsidiary, Homestake Gold Mining Company Limited, abandoned seven of the claims held at the Tebekwe Mine. The other subsidiary, Arcturus Mines Limited, acquired and pegged a further 20 Gold Reef Claims.

After charging £35,262 for depreciation, the net profit earned by the Group for the year amounted to £186,696 as compared with £183,061 for the previous year.

An amount of £52,766 has been provided for taxation and £40,000 has been transferred to General Reserve. Dividends, including dividend No. 15 of 4d. per share, declared on October 26, 1959, totalled 7d. per share and accounted for £93,917. There remains an unappropriated balance carried forward of £18,415 as against £18,402 brought in from last year.

Muriel Mine

The Burnett Shaft was sunk to 83 feet below the 18th level. Primary development accomplished was 5,723 feet; the footage sampled was 2,351, of which 1,135 feet (48%) were payable averaging 13.3 dwts per ton over a reef width of 39 inches. The Drive East on No. 14 level located a new reef some 500 feet beyond the limits of the known payable reefs. This reef averaged 9.4 dwts per ton over 31 inches for 50 feet driven.

The estimated Ore Reserves at June 30, 1959, were 170,630 tons valued at 10.5 dwts. per ton over a stoping width of 46 inches. This reflects an increase of 3,682 tons and a decrease of 0.2 dwts. per ton in value as compared with the previous year. The stoping width was unchanged.

The tonnage crushed and treated during the year was 54,615 as compared with 51,374 for last year.

The working profit at the mine was £123,024, which was £4,377 higher than for the previous year. Working costs were 59/11d. per ton milled against last year's figure of 60/3d.

Arcturus Mine

The Ore Reserves at June 30, 1959, were estimated at 400,481 tons valued at 7.2 dwts. per ton over a stoping width of 59 inches. As compared with last year this shows an increase of 25,249 tons, 0.1 dwt. per ton in value and 2 inches in width.

The tonnage crushed and treated was 87,395 as against 83,190 for the previous year.

The working profit, at 105,020, before charging depreciation, was down by £3,947 on that for last year. The rise in working costs, from 49/8d. in 1958 to 50/10d. per ton milled in the year under review, is due to the increase in development footage.

Tebekwe Mine

This mine continues on a caretaker basis, a number of the mining claims having been let on tribute.

RHODESIAN ANGLO AMERICAN LIMITED

(Incorporated in Northern Rhodesia)

COMPANY WELL EQUIPPED TO CONTINUE ACTIVE INVESTMENT POLICY

MR. H. F. OPPENHEIMER REVIEWS DEVELOPMENTS IN THE FEDERATION

The following are extracts from the review by the Chairman, **Mr. H. F. Oppenheimer**, which has been circulated with the annual report and accounts:

The year since my last statement has been an eventful and important one for the Federation of Rhodesia and Nyasaland and therefore for our Company, whose prosperity must tend to reflect the state of the Federation's economy.

The Federation

We have seen the crisis in Nyasaland and a state of emergency declared in all three territories; the recovery from the low levels of early 1958 in the price of copper and other metals on which the economy is largely based; the long strike on the Copperbelt; the completion of the great Kariba Dam from which power will flow at the beginning of 1960; and the correction of the adverse balance of payments position.

The low price of copper, which touched £160 early in 1958, came at a time when imports were running at a high level, and it was necessary to impose restrictive credit measures. These measures, together with rising prices for copper and other exports, brought about a rapid improvement, which was, however, temporarily checked in October, 1958, by a strike on the Copperbelt. This lasted 54 days and not only seriously affected the output of the copper mines but restricted business activity in the Federation.

The dispute was resolved by the adoption of the proposals of Sir Frederick Leggett, who was invited to the Copperbelt by the Northern Rhodesian Government at the request of the copper-mining companies and their employees, but it was not until May, 1959, that his recommendation that a joint industrial council should be formed was implemented. This council, which consists of employer and employee representatives, should allow matters affecting European daily paid employees to be discussed in an atmosphere of mutual confidence and goodwill, and I am hopeful that it will create a relationship in which fear and suspicion will have no place. This is particularly important as during the years ahead the desire of our African employees for legitimate advancement in the industry will require a practical and level-headed approach.

The progress of the Federal economy was fortunately only temporarily curtailed and, with the improvement in the balance of payments, it was possible for the Government to remove all the credit restrictions and to proceed vigorously with their development plans; these plans are of the greatest importance in paving the way for the raising of the standards of living of the people in the more remote and less prosperous areas of the Federal territories.

We therefore welcome the news that that an Industrial Development Corporation is to be established in the Federation next year, and we have offered to contribute to its capital. It is hoped that this Corporation will be active in promoting manufacture for the home market.

Our own accounts for the year reflect an encouraging advance on last year. Our net profit after taxation was £3,854,213, an increase of more than £1m. on the previous year. We have transferred the sum of £500,000 to general reserve, which now stands at £4,500,000.

We have also been able this year to recommend a final dividend of 3s. 9d. per stock unit (net) on the increased capital, which, with the interim dividend of 1s. 3d. per unit (net), makes a total of 5s. for the year, an increase of 1s. on the total dividend for the previous year.

Investments

Our investments, which are virtually all in the Federation, were valued at the year end (at market prices or at cost where unquoted) at £63,000,000. At the end of October this figure had risen to £87,000,000. Our cash resources place us in a strong position to continue an active investment policy in mining, exploration and industrial enterprises.

Recently the cash copper price on the London Metal Exchange has been more than £250 per ton, the highest figure it has reached for over two years. Chilean production, however, has now been resumed and provided American conditions are soon restored to normal, it is improbable that there will be a real shortage of copper. This is important as it is essential that copper should be freely available at prices which are fair to both producers and consumers if its use is to continue to expand.

Rhokana Corporation and Nchanga Consolidated Copper Mines both declared substantially increased dividends last year, and each company at its year end, in order to bring its equity capital more into line with the capital employed

in the business, made a capital bonus issue.

Bancroft Mines resumed production as planned on April 1, 1959, after a year's interruption, and current operations and development at the mine are entirely satisfactory.

Revenue from sales of Rhodesia Broken Hill's lead and zinc production continued to be affected by the relatively low prices for these metals, and the profit for the year ended December 31, 1958, was substantially below that for the previous year. An improvement in prices, particularly of zinc, had, however, already begun last year and, as this trend has continued during the current year, profits for 1959 can be expected to show some recovery.

In Broken Hill's last annual report reference was made to the possibility of installing the Imperial Smelting Process which would materially improve the recovery of lead and zinc not only from currently produced ore but also from stockpiled material at present untreatable. Careful investigations have been continued into all the technical and financial aspects of the installation of this plant and I am hopeful that the process will be adopted.

With the continued upward trend in the world's industrial activity, particularly in Europe, our major investments should show increasing returns over the next few years, provided that the political progress of the Federation continues satisfactorily.

The Federal Government has demonstrated that it has a real desire to implement its policy of racial partnership, and it is encouraging that the Europeans in Rhodesia have not allowed the violence and disorder which occurred in Nyasaland to cause them to deviate from a courageous and determined attempt to set a new pattern in Africa. My confidence in the economic stability of the Federation has been reinforced, and I believe that if the political problems there continue to be tackled with common sense, patience and human sympathy, this great experiment in Central Africa will succeed.

RHOKANA CORPORATION LIMITED

(Incorporated in Northern Rhodesia)

GROWING IMPORTANCE OF INVESTMENT INCOME

MR. H. F. OPPENHEIMER REVIEWS CHANGING CONDITIONS ON COPPERBELT

The following are extracts from the review by the chairman, **Mr. H. F. Oppenheimer**, which has been circulated with the annual report and accounts.

I feel sure that members will approve of the recommendation of the Directors that the share capital of the Company should be brought more into line with the total amount permanently employed, by utilizing £22.5m. of the "profits appropriated for capital expenditure" to allow a capitalization bonus issue of nine fully paid ordinary shares for each ordinary and "A" stock unit held.

Large appropriations from profits to provide for annual capital expenditure have been made over many years and by June 30, 1958, these totalled £28.8m. It has been decided to transfer the balance of £6.3m. available after providing the £22.5m. required for the capitalization issue to writing down the fixed assets of the Company, which after deducting

depreciation and the amount of £6.3m. stand in our books at £14.8m.

At the forthcoming annual general meeting, members will be asked to pass resolutions increasing the nominal capital of the Company to £26.5m. and to approve the capitalization of £22.5m. so that the new shares may be issued early in the new year.

Copper Price

By the beginning of our financial year, the price of copper on the London Metal Exchange had risen from the low levels ruling during the early months of 1958 to just over £200 per ton. The steady rise in prices was accelerated by the strike on the Northern Rhodesian Copperbelt from September 12 to November 4, 1958, and by the steps taken by many of the large producers to cut their outputs so as to bring copper production into line with consumption.

The price was thereafter generally well maintained between £220 and £250, as many consumers at this time also built up inventories against the possibility of strikes in the United States. These eventually began in August, 1959, and resulted in a reduction of over 80 per cent of America's normal production of copper, but the effects of the steel strike on American industry, together with the large stocks of copper which had been built up, assisted in maintaining the price of copper within the pre-strike limits.

There is however no doubt that by now the world stocks of copper have been appreciably reduced, but Chilean production has now been resumed, and provided American conditions are soon restored to normal, there is no reason to believe that there will be a real shortage of copper.

Although a high level of production was achieved at our mine in the second half of the financial year, it was not possible to make up the full amount of copper lost during the strike of our European daily paid employees at the end of 1958, and our finished production for the year was 13,000 tons less than our programme of 90,000 long tons. However, because of an increase of £38 per ton in the price we received for our copper the profit from mining operations was considerably greater than the previous year.

Good progress has been made during the year at the No. 2 Shaft at Mindola, which is expected to start hoisting ore in the first quarter of 1960, and which will permit greater flexibility in our mining operations. Intensive research in our laboratories has enabled our consulting engineers to design an improved process for the extraction of cobalt which will reduce the cost of production. The revised process should be in operation early in 1960.

Investment Income

This year our net income from investments was again greater than the profit from our mining operations. This focuses attention on the very large share interest which we have in Nchanga Consolidated Copper Mines Limited and Mufulira Copper Mines Limited, from which our dividend revenue arises. As we also have a major stake in Bancroft Mines Limited and Chibuluma Mines Limited, from which in due course we can expect satisfactory dividends, our income from dividends and interest should form an increasingly important proportion of our total income. We are also interested in Baluba Mines Limited and Chambishi Mines Limited where large copper deposits have been proved and which will in due course be opened up, and we have a stake in a number of exploration companies.

Rhokana Corporation is therefore a large investment company as well as an active mining company, and over the past few years we have been able to follow up our investments and, at the same time, place the company in a sound cash position to provide its share of the capital which will be required for this purpose at a later date.

This year an amount of £500,000 was transferred to general reserve which now stands at £5,500,000 and, at the same time, we have been able to recommend a final dividend of 32s. 6d. net per £1 unit of stock which, together with the interim dividend of 7s. 6d., makes a total dividend distribution of 40s. net per unit for the year.

Conditions on the Copperbelt have changed very rapidly since the copper mines were originally discovered and, as local and government authorities are now able to provide most of the services at present run by the mining companies for the benefit of their employees, we have been endeavouring to find a means whereby we could hand over such services and amenities to the proper controlling bodies and to bring about a greater degree of integration between the Kitwe Municipal Council and our own Nkana Mine Township. One important step was the introduction of the home ownership scheme in 1957 for our European employees.

THE CEMENTATION COMPANY LIMITED

INCREASE IN TRADING PROFIT

The 39th annual general meeting of The Cementation Company Limited will be held on December 16 at Grosvenor House, Park Lane, London, W.1.

The following is an extract from the Statement by the Chairman, Mr. A. R. Neelands, circulated with the report and accounts:—

The trading profit of the Group for the year under review, before charging taxation and before deducting pre-acquisition profits of a newly-acquired subsidiary taken to Capital Reserve, is £1,144,649 as compared with £1,031,640 last year.

We have transferred to General Reserve £100,000, and £150,000 has been transferred to the General Reserve of a subsidiary company.

Your Directors recommend a dividend payment of 12½%, as last year, on the Ordinary Shares which, due to an increase in capital and a reduction in the rate of United Kingdom Income Tax, will absorb £244,043 against £215,625 last year.

Parent Company at Home and Abroad

In South Wales we are still active on drifting work for the National Coal Board, and elsewhere we also have a number of worthwhile contracts of a more general nature in progress.

Mining operations have continued at the same high level, but it is evident that due to the general contraction of development in the coal mining industry, this state of affairs cannot be expected to continue after the present shaft sinking programme has been completed. Investigations of prospects abroad are being intensified, but overall we must expect a period of restricted activity.

Contraction in the coal mining industry, the effects of which have yet to be felt by our Mining Department, has already had repercussions on our Drilling Department. This was foreseen over a year ago, and re-organization to adapt to altered circumstances has taken place by amalgamating the Drilling Department with our subsidiary, John Thom Limited, thereby effecting administrative economies and increasing operational efficiency.

The necessity for such re-organization is indicative of the effect on our business of changes in national policies and I will revert to this when reporting on the Geoprosco Group, which is particularly susceptible to changes in certain spheres of economic policy. In connection with

We have also provided a number of benefits and services for our African employees, and it is our aim, whenever it is possible to do so within the limits set by the complex conditions and circumstances of the Copperbelt, to establish the same rights and privileges for our African employees as for our European. We hope therefore to be able to announce shortly a scheme for home ownership for our African employees and, although it will take time, we are hopeful that it will be possible for all our employees to be able to take full share in the provision and running of the services and amenities which are part of an established civic community.

our drilling activities, I might recall that in 1941, when the Ministry of Fuel and Power sought contractors able to undertake large-scale exploratory work for opencast coal, we were foremost among those with the operators and equipment able to do such work on a large scale, and we continue to work successfully on the present reduced scale of development. Over the years, our crews have drilled in the coal fields of England, Wales and Scotland a total of almost nine million feet.

Now that we are reaching the end of what must be amongst the most remarkable series of contracts in the history of the Company, we must look elsewhere for alternatives, and this amalgamation is one step towards the development of other outlets for our crews and equipment.

Subsidiary Companies

John Thom Limited—which now includes our Drilling Department—has had a difficult year because deep drilling work at home has fallen off to a great extent and efforts being made to obtain alternative outlets overseas have not yet had time to bear fruit.

Our South African Company has maintained its position and has returned an increased profit, despite the fact that during the year the general level of economic activity in South Africa has remained static or declined slightly.

The Company has recently been successful in obtaining from the O'Okiep Copper Company Limited a contract for the sinking of two mine shafts, one to 1,900 feet and one to 3,000 feet.

The prospects of our Rhodesian Company are equally good. At Mufulira we have obtained further contracts for mine shaft sinking from the Mufulira Copper Company, who are well pleased with our progress. Some road contracts, embodying soil stabilization in Rhodesia and Kenya, have been obtained.

Our Canadian Company's shaft sinking work at Goderich and at Pugwash showed good results. The ability of the Company in overcoming successfully the problems encountered in these shafts has become widely known in Canadian mining circles, and we hope to extend our services to other clients who are considering sinking shafts through difficult measures. The volume of other specialist work available is still less than anticipated and it seems probable that for some time to come results from these are likely to remain below our expectations.

KAMUNTING TIN DREDGING

MR. ADDINSELL'S STATEMENT

The 46th annual general meeting of Kamunting Tin Dredging Limited was held on November 24 at 55-61 Moor-gate, London, E.C.2, Mr. J. Addinsell (the Chairman), presiding.

The following is the Chairman's statement for the year ended March 31, 1959, which had been circulated with the report and accounts and was taken as read:

The total tin production for the year from both the Company's Malayan and Thailand areas was 1,252 tons tin concentrate, as against 1,661 tons last year. The sales for the year amounted to 1,007 tons tin concentrate, compared with 1,620 tons in the previous year.

The fall in our production and sales was due to the whole year being affected by tin export control as against only 3½ months in the previous year. The average price realized for our sales was, however, higher at £736 per ton metal compared with £725 per ton last year.

The permissible carry over stocks of tin concentrate have been increased from 41 tons last year to 286 tons at March 31, 1959, and are available for subsequent realization.

The profit for the year was £174,373 from which must be deducted £66,000 for taxation, leaving £108,373.

Your Directors recommend the payment of a final dividend of 17½ per cent, which with the interim dividend of 7½ per cent paid on March 3, 1959, will absorb £100,522, leaving the carry forward £82,834.

Our total contributions to the Buffer Stock to the end of the year under review, after deducting interest on advance deposits, amount to £137,677. While further contributions have been made since the close of the year, payments ceased in Malaya in August, 1959, when the Malayan Government announced

that the total contribution had been collected.

Transfer of No. 6 Dredge

The Revenue Reserves remain at £587,500 and as I have previously informed shareholders a large part of this reserve will be required for the transfer of the No. 6 Dredge to the area acquired from the Taiping Rubber Company. It is expected that this will take place in about two years' time and will take some eighteen months to complete, during which time, of course, our production must be affected but it is difficult to make any forecast having regard to the International Tin Agreement.

The year's dredging operations are, as usual, shown on the Technical Managers' Report. Outputs for both No. 5 and No. 6 Dredges in Malaya were satisfactory but at the end of January, 1959, the No. 5 Dredge was closed down due to export control. In Thailand, our output was obtained from the No. 1 Dredge for the first six months and from the No. 2 Dredge for the second six months of the year.

The Malayan No. 1 Dredge, a shallow-digging unit which was first commissioned in 1915 and was our oldest dredge, has since 1953 been on a care and maintenance basis. As it was most unlikely that a suitable area would ever be found for it, it was sold after the end of the year for scrap and realized some £9,000.

Since the close of the financial year export quota releases have been increased and our permitted sales for the nine months from April 1 to December 31, 1959, will be about 906 tons tin concentrate, compared with 773 tons for the same period last year.

I am happy to say that since Malaya

received its independence, relations with Government continue to be most satisfactory.

I would once again convey our appreciation to our Managers in the East, Anglo-Oriental (Malaya) Limited, and the staff at the mine, for the excellent service they have rendered to your Company.

The Report and Accounts were unanimously adopted.

News and Results—

Continued from page 547

Temoh Tin.—Results of Temoh Tin for the year ended June 30 last show a loss of £1,216 compared with a profit of £565 in the preceding twelve months. A sum of £2,153, not taken into account when arriving at the above-stated loss, was credited in respect of a surplus on the sale of fixed assets. No dividend is recommended. Meeting, December 22.

Transvaal and Delagoa Bay Scrip Issue.—Transvaal and Delagoa Bay Investment Company propose to make a capitalization issue of two new £1 shares for every one held. The issue, which will absorb 721,500 new shares, is subject to shareholders' approval at an E.G.M. to be held in due course.

Middle Wits and Rooderand.—On November 10, court sanction was given to the arrangement by which Middle Witwatersrand Areas will acquire 872 per cent of the assets of Rooderand Main Reef. Shareholders' sanction was given on October 16, and the resolutions will become effective on December 7. Rooderand shareholders are requested to forward their certificates to the company not later than December 7. The distribution of shares in Freddie's Consolidated and in Middle Wits will be made in mid-January to shareholders of record on this date, but only to those whose certificates and/or transfer receipts have been received.

Inco Quarterly Payment.—International Nickel Company of Canada has declared a quarterly dividend of 65 c. per common share, together with a year-end dividend of 40 c., both payable on Dec. 21 to shareholders of record November 23.

Meru Tin.—After deducting depreciation of £572, Meru Tin made a loss of £6,568 in the year to June 30 last. This compares with a profit of £3,545 in the preceding twelve months. The dividend is again passed. Meeting, December 23.

Minerals Separation Pays 4d.—Minerals Separation has declared an interim dividend of 4d. per stock unit on its £2,000,000 capital. This compares with a dividend of 6d. on £1,000,000 capital last year. A further 20 per cent of the capital of Foundry Services (Holdings) has been purchased, increasing Mineral Holdings' interest in this company to 80 per cent.

New Modder Liquidation.—A first and final liquidation account for New Modderfontein Gold Mining has been placed before the court in Pretoria. The account provides for a first and final liquidation distribution of 1s. 4.896d. per share, and this will become due on December 12, subject to court confirmation.

R.S.T.

A copper mine in NORTHERN RHODESIA in the RHODESIAN SELECTION TRUST GROUP invites applications for the under-mentioned vacancies:—

LEARNER OFFICIAL (MINING)

Candidates should hold a mining degree or equivalent qualification. The successful applicant will be engaged in studying local methods of underground mining, mining layouts, &c., and in due course will be required to obtain a Northern Rhodesia Blasting Licence.

Basic starting salary £1,034 per annum rising to £1,100 per annum after one year's practical underground experience. See below for additional emoluments.

Leave at 41 days per annum may be accumulated up to 123 days.

SENIOR ENGINEERING ASSISTANT (MINING)

In addition to a university degree or equivalent qualification, candidates should have had at least three years' practical experience in the mining industry. The successful applicant will be working under the direction of the Mining Engineer and will be engaged in the preparation of schedules and investigations into mining methods, costs, &c.

Basic starting salary £1,358 per annum. See below for additional emoluments.

Leave at 51 days per annum may be accumulated up to 153 days.

In addition to basic salary employees receive a bonus related to the prosperity of the Northern Rhodesian Copper Industry. At present this bonus is 36 per cent on basic salary. They also receive a cost-of-living allowance, payable monthly, which is currently £66 per annum.

The company has a contributory pension and life assurance scheme. Medical and specialist treatment is provided for the employee and his family at a nominal monthly subscription.

The employee's outward passage is paid. Applications should be addressed to:—

Appointments Officer,

SELECTION TRUST LIMITED,

Mason's Avenue, Coleman Street, London, E.C.2.

PLEASE QUOTE R.28 MJ

CONSOLIDATED AFRICAN SELECTION TRUST

RECORD TRADING RESULTS

MR. A. CHESTER BEATTY'S REVIEW OF OPERATIONS AND DEVELOPMENTS

The 35th Annual General Meeting of Consolidated African Selection Trust Limited will be held on December 18 at Selection Trust Building, Mason's Avenue, London, E.C.2.

The following is the Statement by the Chairman, Mr. A. Chester Beatty, which was circulated with the Report and Accounts for the year ended June 30, 1958.

A year ago I told you I was confident that the trading results for the year to June 30, 1959, would be no less favourable than those for 1957/58. I am pleased to report to you now that the consolidated gross profit of £2,891,000 for the past year, which compares with £2,677,000 for 1957/58 is the highest we have yet achieved.

Although the amount of taxation we shall have to pay has increased by about £67,000 to £1,584,000, the net profit for the year of £1,307,000, against £1,160,000, is also a record. Last year we were able to add taxation adjustments of £334,000, most of which had been previously set aside for future taxation but was no longer required as the Company and its principal subsidiary, Sierra Leone Selection Trust, had qualified as Overseas Trade Corporations. This year taxation adjustments are much smaller at £13,000, and the net profit after adjustments is £1,320,000.

DIVIDENDS

As I explained last year, the net profit for 1957/58, after adding back the large taxation adjustments referred to above, would have permitted the payment of a higher final dividend, but instead a special interim dividend for 1958/59 of 1s. 0d. per share was paid in December, 1958, simultaneously with the final dividend for 1957/58.

An interim dividend of 9d. per share was paid in June and the Board have recommended a final dividend of 2s. 6d. per share which, disregarding the special interim dividend which was really paid out of taxation recoveries, makes a total of 3s. 3d. per share, less income tax, compared with 2s. 6d. per share for last year.

Dividends totalling 3s. 3d. per share will require £1,207,000 of the net profit of £1,320,000.

Operations in Ghana

The operation of the first part of the new Anincheche plant which was completed in June, 1958, enabled us to increase the amount of gravel treated in the plants to 725,000 cubic yards yielding a record production of 1,252,000 carats.

It is hoped that the second part of the Anincheche plant will be brought into production in July, 1960. Some of our other plants were installed over thirty years ago and, although additions and improvements have been made to them, the time is now approaching when it would be more economical to replace them by one large centralized modern plant and we are studying proposals to that effect which would require capital expenditure of the order of £1,000,000. I consider that the reserves of gravel available to the Company are sufficient to warrant expenditure on this new plant which would also increase the mine's capacity.

The town of Akwatia is very close to our headquarters in Ghana and we had hoped to be able to extend the Company's power supply to provide lighting in the town. However, with additional demands for more power for our operations, this has not been possible and we have, therefore, during the current year presented to the Government £10,000 to be spent on an electricity supply for the town.

Training

Our relations with the Ghana Government are most cordial and I think our efforts to train Ghanaians for positions of responsibility are appreciated in the country. Nearly seventy Ghanaians are receiving full-time training on various technical courses. The benefits from the considerable cost of these training schemes will become more apparent over the next few years as the newly trained men become available to take part in the productive side of the mine's operations, although the standard of artisan has already shown a marked improvement.

Operations in Sierra Leone

Few mines have had to contend with greater difficulties over the last few years than our mine in Sierra Leone. I am glad to say that we celebrated our silver jubilee there this year with results that are most satisfactory and with a great improvement in security.

We produced about 640,000 carats of diamond from 605,000 cubic yards of gravel, but the amount of overburden which has to be removed before the payable gravel is reached has more than doubled during the last five years as we have moved into less accessible and deeper deposits. We now have a large earth-moving operation which is made more complex by being split up over a number of separate operational areas, some at a considerable distance from the main camp.

Our prospecting and development continues to reveal further areas of workable ground both in our Yengema and Tongo leases.

Security

The improvement in security has not been achieved without considerable effort and heavy expenditure. In October, 1958, it was no exaggeration to say that the continued life of our mine was in serious danger because of wholesale and uncontrolled illicit mining within our central reserve area. Faced with a situation approaching anarchy in one part of the country and with the likely loss of the considerable revenue on which Sierra Leone relies so heavily, the Government took legislative action which gave more effective powers of control. We have been much encouraged by the Government's determination to bring illicit mining under control, but in order to assist we have been obliged to increase our own security force, which is now largely deployed in strong posts sited on the most important reserves in our concessions. These strong posts are each linked to police headquarters by radio telephone, so that if illicit mining starts, or there is an attack on the post, a striking force can be deployed quickly. The construction of these posts together with many miles of access roads has been expensive, as is the continued main-

tenance of a large security force itself. I feel, however, that the improvement I have mentioned stems directly from these new measures and we must therefore continue on the same lines.

Kono Development

Physical security measures alone are not sufficient and it has long been a cause of complaint by the people of Kono that they have not been given a fair share of the taxation arising from our operations in Kono. I welcome the announcement that the Government plans to spend £95,000 in 1959/60 in connection with the Kono Development Scheme, mainly on the provision of better roads and bridges. In view of the very large amounts we pay in taxation, we hope that in future years larger funds will be allocated for development in those areas in which we mine.

Contract Mining

Unlike others in Sierra Leone, those people who live within our leases are unable to mine diamonds legitimately for their own account. There are a few areas in our leases which, having regard to our programme for the siting of our washing plants, can be mined suitably by hand methods and we are, therefore, introducing a scheme of contract mining with sites in most Kono Chiefdoms. A contractor is selected, taught controlled methods of hand mining and then allotted a site to work for his own account. We supervise the scheme closely and also buy the diamonds. We need considerably more experience in this type of operation before we can reach valid conclusions, but the scheme has been very well received in Kono where the first two sites opened have so far proved most successful. We hope the scheme will go a long way to satisfy local feeling and will result in a more co-operative attitude towards the Company's security problem.

Training

The training of Sierra Leoneans for more responsible positions on the mine continues along the same lines as in Ghana, but we are handicapped by the low standard of education in the country. It is clear, therefore, that we shall need to maintain a large expatriate staff for many years to come. One factor which must deter senior technical and administrative staff from taking up employment in West Africa is that the effective tax rates, particularly in Sierra Leone, are high compared with those in other countries in Africa where mining forms an important industry. Indeed, with the progressive reduction in the level of income tax in the United Kingdom over the past few years, senior staff in Sierra Leone are having to pay almost as much tax as they would if they had earned their salaries in England. This cannot be to the long-term advantage of either the Government or the mining industry.

In spite of an abortive strike by some of our employees which lasted two days, our labour relations remained excellent.

SALES

World sales in 1958, particularly of the industrial qualities, reflected the mild recession which took place in the U.S.A. and Europe but they have since recovered and present indications are that 1959 will be a record year.

Ghana

I referred last year to the proposals of the Minister of Finance which would eventually require us to sell our production through the Accra Diamond

Market. We have had discussions with the Government on this subject but throughout the year we have continued to sell our production to the Central Selling Organization under existing contracts which expire on December 31, 1960.

Sierra Leone

In August of this year a Government Diamond Office was set up, which is managed on behalf of the Sierra Leone Government by The Diamond Corpora-

tion. The Office will either buy African-won diamonds direct from dealers or send the diamonds to London for sale by tender. The selling arrangements of Sierra Leone Selection Trust are not affected.

DIRECTORS AND STAFF

Mr. C. W. Boise resigned from the Board in September this year. It was as a result of his early work in the field that the Selection Trust Group became

interested in West African diamonds, which led to the formation of this business. He was Managing Director in the early days and later became Vice-Chairman and then Chairman, vacating the latter position in 1953. Our debt to Mr. Boise is considerable and his retirement is inevitably a sad event.

Finally, I should like to commend all those who work for the Company in West Africa and at home on another excellent year's results.

THE RENONG TIN DREDGING COMPANY

FULL-TIME WORKING RESUMED

SIR JOHN HAY'S STATEMENT

The 46th Annual General Meeting of The Renong Tin Dredging Company Limited, will be held on December 15 at 52/54, Gracechurch Street, London, E.C.

The following is an extract from the circulated statement of the chairman, Sir John Hay:—

The Company's financial year started at low ebb. Only one out of our three dredges could be kept in operation at the level of production then permitted under the tin control regulations and even that had to work at less than its capacity. Export of tin-ore from mines was cut to 48.5 per cent of assessed productive capacity which was further reduced to 43.6 per cent during the last quarter of 1958. This further reduction was required because in September the Manager of the Buffer Stock, whose primary task it had been to purchase tin so as to maintain the price at a floor level of £730 per ton, had exhausted his funds and was unable to continue to purchase the metal being dumped by countries which were not parties to the International Tin Agreement. Fortunately, tempted perhaps by the steep fall in price that followed this withdrawal, buyers returned to the market and the price quickly recovered to floor level and thereafter gradually rose and reached £790 per ton by June, 1959. Since then the price has been maintained at about that figure despite the rate of quota release in Malaya having been increased to 62.5 per cent of assessed productive capacity, and the sale of a substantial proportion of his stocks by the Buffer Stock Manager. We hope that this evidence of a revival in trade demand for tin will be sustained.

Mining Operations

As a result of the increase in export quotas granted to the mines, which coincided with the Jinjang Dredge moving into lower value ground, full-time working was resumed by that unit towards the end of the financial year, and part of the permitted mine stocks of tin-ore accumulated was sold.

At Rasa, both Nos. 2 and 3 Dredges were on care and maintenance until April, 1959, when operations were resumed by No. 2 Dredge. It has worked profitably since that date. The third Dredge, which has only a limited life in front of it at its present site, is being reactivated at the end of November, 1959.

Accounts

The whole of the financial year was affected by export control whereas in the previous year the Company's Dredges were operating freely for six months. Profits were seriously affected by the low

level of export quota permitted, being reduced from £53,396 to £28,844 before tax. Fortunately, £20,000 appropriated in previous years to provide for taxation became surplus to requirements and the Board are thereby enabled to recommend a repetition of the previous year's ordinary dividend of 6d. free of tax per 2s. unit of Stock.

Regulation of Supplies

The recent improvement in the demand for tin with its agreeable consequence of a higher permissible export quota is of course welcome and should be productive of much better results in the current year. Longer-term prospects are bound up with the fate of the agreement for the regulation of tin supplies which terminates in 1961. It would be churlish to omit to acknowledge that the present agreement has succeeded, albeit after much tribulation, in achieving its main object which is to establish and maintain a stable price at a profitable level, a condition highly acceptable to all tin producers. But it would be foolish to ignore its manifest defects. Participation is not universal; the chief benefits go to producers in non-participating countries and in their continuance in this privileged position they become increasingly a menace to the success of any restriction scheme. Between the contracting countries the measure of restriction is not equitably shared. The price objective is liable to be determined by reference to immediate advantage rather than by consideration of long-term economic consequences. In the course of the working of any scheme such as the present tin agreement, there invariably develops a vested interest in its indefinite continuance which is not to be frustrated by a too eager determination to remedy defects and faults. These brief observations are not to be construed as an exhibition of indifference to the problems of an imbalance between supply and demand, the fears of which are a recurring threat to all commodity producers and their occurrence can be productive of dire consequences in primary producing countries, many of which come within the category of the underdeveloped. They should be interpreted as a plea for a more searching and objective study into the problem and its treatment. In the meantime, it would seem not too optimistic to expect that before 1960 is far advanced restriction over exports of tin will be more nominal than real. Freedom from the burden of immediate over-production provides the favourable atmosphere for a study based on past experience and aimed at providing safeguards against future eventualities.

Publications Received

Peaceful Uses of Atomic Energy: Vol. 6, Basic Metallurgy and Fabrication of Fuels. Pp. 720. Published by the United Nations. Price U.S.\$18.00; £6 9s. (stg.); Sw. fr. 77.000 (or equivalent in other currencies).

This is the sixth volume of the Proceedings of the Second United Nations International Conference in Geneva, September, 1958, which are being published in 33 volumes, constituting a unique survey of the work on peaceful uses of atomic energy which is going on throughout the world.

The scope of the section dealing with basic metallurgy is very wide. The papers on physical metallurgy cover such subjects as the mechanical properties of uranium, plutonium and thorium in the metallic state, and of their alloys, alloy behaviour and the physical properties of alloys in various combinations. Several papers deal with irradiation effects, including such aspects as the corrosion behaviour of materials under irradiation.

The latter part of the book deals primarily with the fabrication of uranium fuels, the uranium being in the form of metal alloys, ceramic or oxides. The relevant papers give a very comprehensive analysis of current developments in the fabrication of fuel elements and their behaviour in reactors.

Iron Deposits of Eastern Ontario and Adjoining Quebec. Geological Survey of Canada, Bulletin 45, published by the Department of Mines and Technical Surveys, Ottawa, Canada, pp. 120, with map and diagrams. Price \$1.00.

This report deals with geological features of the magnetite and haematite deposits of a region comprising some 16,000 sq. miles in eastern Ontario and that part of Quebec near the lower Ottawa River. The report summarizes the results of an investigation made during 1952, 1953 and 1954, and is intended to assist in understanding the nature of occurrence and the origin of the deposits with a view to aiding their orderly development and the search for other deposits. Brief comparisons are made between this and other iron districts, especially the Adirondack region of the state of New York.

The Natural Durability of Timber. Forest Products Research, Record No. 30 (2nd Edition). 26 pp., published by the Department of Scientific and Industrial Research, H.M.S.O. London, price 2s. This report describes a field service test which is being carried out by the Forest Products Research Laboratory to determine the natural durability of different timbers.

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